

Module 4. Universal Access and Service

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Module 4. Universal Access and Service

The term *universal access* is used in a wide variety of contexts to describe or demonstrate objectives and policies that governments implement to ensure that all their citizens have access to the benefits of modern economic life. It refers to the ability of everyone, regardless of region or location, socio-economic status, ethnicity, gender, disability, or any other factor, to access necessities. The term is widely used in the contexts of health care (especially for the prevention and treatment of HIV/AIDS), primary education, electricity and energy, and water and sanitation, as well as Information and Communication Technologies (ICTs).



Even if some governments themselves are not yet using the term *universal access* in these contexts, the international organizations and agencies which support their drives towards social and economic development are doing so. The concept is broadly promoted and widely accepted as the best expression of policies seeking to achieve equality and fairness of opportunity along with economic growth.

This module explores all aspects of universal access for ICTs. The value and importance of ICTs cut across all other sectors of the economy. ICTs are therefore increasingly recognized as a pillar of modern society. No other sector seems to work efficiently without them when the “information economy” takes root and grows. Also, no country, irrespective of its level of income, can ignore this trend; benefits of such diverse activities as governance, tourism and finance are critically dependent upon information and communications. This is why the term *enabler* is often used of ICTs.

For ICTs, universal access can be understood as a step towards universal service. It aims to increase access to ICTs throughout communities by a balanced distribution of points of access.

This chapter provides information critical to understanding the basic concepts of universal access and universal service, the progress being made towards universal access and universal service internationally, the rationale behind universal access policy, international trends and developments, and integration of universal access for ICTs with other national policies and programmes.

THIS MODULE IN OTHER LANGUAGES:

[Version française \(PDF\)](#)

[Versión Española \(PDF\)](#)

1 Universal Access: an overview

CHAPTER 1 TRANSLATIONS

 [Version française \(PDF\)](#)

 [Versión Española \(PDF\)](#)

This module explores key aspects of universal access and service (UAS) for information and communication technologies (ICTs). The value and importance of ICTs cuts across all other sectors of the economy. ICTs are recognized as a pillar of modern society, as no other sector seems to work efficiently without them. Diverse sectors such as governance, education, health, business, finance and tourism are critically dependent upon information and communications. Also, no country, irrespective of its economic status, can ignore the trend towards ubiquitous use of ICTs. This is why the term enabler is often used to describe ICTs.

This module is structured as follows:

- [Chapter 1](#) is an introduction to UAS;
- [Chapter 2](#) gives an overview of regulatory reform which is the first vital step of increasing UAS using market mechanisms and good regulation;
- [Chapter 3](#) introduces the main approaches and specific UAS instruments, policies and interventions that policy-makers and regulators can use beyond sector reform;
- [Chapter 4](#) discusses details of UAS policy development, its framework and process;
- [Chapter 5](#) explains financing issues related to UAS and financial analyses;
- [Chapter 6](#) outlines details of UAS programme development and economic analysis, in particular for project prioritization;
- [Chapter 7](#) describes the competition process of awarding subsidies for the provision of UAS by operators and service providers; and;
- [Chapter 8](#) gives an overview of technology issues and trends that are particular relevant for UAS.

[Chapter 1](#) provides information that is critical to understanding the basic concepts of universal access (UA) and universal service (US), the progress being made towards UAS internationally, the rationale behind UAS policy, international trends and developments, and integration of UAS for ICTs with other national policies and programmes.

Origins of universal service

Historically, the term and concept of US existed before UA. US for telephone service, first mentioned in the 1934 Communications Act of the United States, describes the concept of affordability of telephone services, as well as its universal availability for households desiring that service. UA is focussed on public, community or shared access to telecommunications.

US only came to the forefront with the advent of market liberalization and sector reform. For example, specific aims for serving all reasonable demands for basic telephony service were formulated in 1984 with British Telecom's privatization. Prior to that, affordable service for all was an implicit obligation by the management of the state-owned enterprise, similar to the situation in many other countries.

Market liberalization and competition triggered a debate on US, surrounding the key questions of how to achieve it in a deregulated environment, how much US costs, and who shall bear the costs. The debate distinguished between the goal of US and the means of achieving it, while acknowledging that telephone service is an important basic right, essential for social cohesion and economic development. Since then, tremendous strides have been made towards achieving US and in many countries it is a reality.

Universal service and access today

The concepts of US and UA to telecommunications and ICT are distinct. US refers to service at the individual or household level, e.g., typically a telephone in each home. UA refers to a publicly shared level of service, e.g., through public payphones or Internet telecentres. However, they are also intrinsically linked to each other, as UA is the pre-cursor for US.

In the past, developing countries typically focussed mostly on universal access (UA), meaning community and publicly shared access, as UA was the appropriate and most feasible target. However, since the maturation of mobile communications, which extended services further and lowered access barriers to take up, many developing countries might realistically target US for telephony in urban areas. And also, in addition to setting UA targets for rural areas, the objective of increasing rural penetration can be set.

ICTs include both telephony and Internet, and some countries are at the stage where they have achieved UA to telephony and their goal is to achieve US, while in the Internet realm their goal is UA. Thus, their policy is no longer solely focussed on UA but on both UA and US.

In the more developed world which previously had US policy goals, the onset of broadband has led to re-use of the term UA. It is often recognized that universal availability of broadband services may not necessarily yield universal service-like household penetration for many reasons, though the provision of affordable access is an important goal.

As the reality in more and more countries relates to both UA and US, it makes sense to use the generic term universal access and service (UAS).

Thus, this module of the toolkit will refer to both terms with a focus on addressing UAS in the context of developing countries and emerging markets, while also drawing on best practice and experience in the developed world.

Scope of universal access and service

While US was once reserved for basic voice communications, UAS policies and strategies go beyond telephony, and include at least data and Internet communications, and increasingly look towards broadband communication. Traditionally, broadcasting has not been a part of UAS, but is now regarded as part of ICTs, in particular as the underlying technologies and delivery mechanism between telecommunications and broadcasting are converging. First models of how to include broadcasting in UAS policies are explored. However, media laws and policies have fundamentally different requirements which go beyond affordable access and service. Their focus is on a diversity of content providers, quality content development, pluralism and independent news reporting, choice and media freedom, and media ethics and control against illegal and harmful media content. These content elements have traditionally not been part of UAS for telecommunications. As a consequence, developing UAS requirements for broadcasting is breaking new ground.

Increasingly, UAS policy needs to be as forward-looking as possible and include broadband developments, the move towards a next-generation network (NGN) environment and address issues of convergence. The future challenges for policymakers are how to address the increased requirements and complexities of UAS while at the same time having UAS policies and programmes that achieve their goals quickly and efficiently. This Toolkit is intended to inform and support policymakers and UAS policy implementers to meet this challenge.

1.1 Concepts of universal access

For ICTs, UA and US can largely be characterized by the availability, accessibility and affordability of telephony and the Internet, with increasing consideration of the inclusion of broadband and broadcasting. These terms, as used in this toolkit, are found in [Section 1.1.1](#).

Typically targets for universal access and service (UAS) in developing countries relate to telephony and the Internet. How these targets can be selected and related to indicators of development is described in [Section 1.1.2](#). A more general discussion of extending targets to communications capabilities is discussed in [Section 1.1.6](#).

Technological developments, liberalization, improved sector regulation, and enlightened import duty and tax regimes let network infrastructure and service provision be expanded at lower costs and with better quality than before. However, these developments make it necessary to continually monitor the scope and status of UAS and to make sure that all members of society can benefit from them. In fact, as outlined in [Section 1.1.3](#), the scope of UAS tends to broaden: because of the developments in technology and society it often includes not just telephony and Internet, but special services based on telephony, and also the Internet in one form or another.

A method for choosing which services to include in the scope of UAS, is suggested in [Section 1.1.4](#). Developments in the ICT sector and changing UAS requirements impact the debate on required regulatory intervention, as discussed in [Section 1.1.7](#). The question of how to target groups for special assistance, if and when it is appropriate, is discussed in [Section 1.1.5](#).

1.1.1 Basic definitions

This toolkit uses the following definitions in regards to communications services:

- **Universal access (UA)** is when **everyone can access the service somewhere, at a public place, thus also called public, community or shared access**. How many points of access are needed is discussed in [Section 1.1.2](#). In general there would be at least one point of access per settlement over a certain population size.
- **Universal service (US)** describes when **every individual or household can have service, using it privately, either at home or increasingly carried with the individual through wireless devices**. For some services, a goal of full US would be too ambitious at present in a developing country, because the services must be affordable as well as available. Goals may relate to the proportion of the population that can afford private service (i.e., subscriber penetration targets).

The three hallmarks of UA and US are:

- **Availability**: the service is available to inhabited parts of the country through public, community, shared or personal devices;
- **Accessibility**: all citizens can use the service, regardless of location, gender, disabilities and other personal characteristics; and
- **Affordability**: the service is affordable to all citizens.

These three aspects are relevant to both UA and US, but in different ways and to different degrees. The figure below illustrates UA/US similarities and differences: the essential characteristics are *in italics*, while desirable characteristics are not.

Figure: Characteristics of universal access and universal service

Aspect	Universal access	Universal service
Availability	<i>Focused coverage</i>	<i>Blanket coverage</i>
	<i>Public access (e.g., at a payphone or telecentre)</i>	<i>Private service on demand</i>
	<i>Free emergency calls</i>	<i>Free emergency calls</i>
Accessibility	<i>Walking distance, convenient locations and hours</i>	<i>Simple and speedy subscription</i>
	Inclusively designed premises (e.g., for wheelchair users); inclusively designed terminals or available assistance (e.g., for the blind or deaf)	Inclusively designed terminals and services (e.g., for blind or deaf people)
	Assistance from an attendant	Assistance through the terminal (e.g., by making calls or viewing help pages for the web)
	Adequate quality of service (e.g., having few failed call attempts)	Reasonable quality of service (e.g., having few dropped calls)
Affordability	Options of cash and card payment	Cost of average monthly usage is a small percentage of monthly GNI per capita
	Options of cash and card payment	Options of cash, card and electronic payment
	Payment per use (e.g., for a single call or message or an hour of Internet access)	Flat rate, bundles of services or low monthly subscription fee

Source: ITU-infoDev ICT Regulation Toolkit – UA Module

The following concepts are the steps in the progression of UA to US:

- Universal access: Every person has affordable and reasonable public access to defined ICT services considered essential for social inclusion and economic development;
- Universal geographic coverage: 100 per cent of the population living in population centres above a certain size can obtain a defined ICT service provided that the user has the ability to pay for the service; and
- Universal service: 100 per cent of individuals or households can afford ICT services categorized as part of US, and a majority of the population subscribes to these services.

The concepts of UA and US are applicable to the following ICT services:

- Telephony (voice calls and text messages), offering one-to-one communication as well as content distribution to a wider group. Text messages are often also significant for UAS, because the affordability of text messages outweighs the inconvenience of using mobile phone keypads and displays.
- Narrowband and broadband Internet, providing e-mail, live-chats, web-browsing, content distribution, Voice Over IP (VoIP) and IP Television (IPTV), among many other applications and services. Many countries also want UA to the Internet however this requires higher levels of skill and education than with broadcasting or telephony. Therefore, accessibility through instruction and assistance and content that is useful and appealing is particularly important.

- Radio and television broadcasting. While broadcasting has traditionally not been a part of UAS policies, it is increasingly being considered, due to the convergence of technologies and triple-play offers by service providers (e.g., cable TV operators also providing telephone and Internet services). UAS policies exploring the inclusion of broadcasting are emerging. This is especially the case in countries that have adopted a multi-sector regulator overseeing both telecommunications and broadcasting.

1.1.2 Universal access and service targets

Universal access and service (UAS) measures are usually targeted at rural areas that are unserved or underserved, and especially low-population density areas where provision of services is not viable. But UAS targets can also be focussed on very poor urban areas in large metropolitan cities, including slums.

Developing countries typically set the following universal access (UA) targets:

- A public phone for a certain size of community (e.g., for all communities larger than 2000 inhabitants);
- A limited walking distance to a public phone (e.g., 5 km for communities too small to have their own public phone);
- An Internet POP in districts centres, provincial capitals or towns above a certain size (e.g., above 20,000 inhabitants) that provides either high-speed or broadband capacity; and
- A public access Internet centre accompanying the Internet POP.

Increasingly, modest universal service-like targets are included in developing countries policies, such as:

- An overall telephony subscriber penetration of 20 per cent and a rural penetration target of 10 per cent within a specific time frame (e.g., by 2010); and
- Asking operators to provide a tariff option that allows households in the lowest income decile (10 per cent) a minimum or modest use.

To be useful, **targets need to have the following characteristics:**

- Targets should focus on needs that have clear indicators and high priorities so that efforts are not spread too thinly among too many targets;
- Targets should be designed to look ahead three to five years;
- Targets should be ambitious but realistic in the light of a country's actual situation;
- Targets should be reviewed regularly (e.g., every two or three years) to remain ambitious but realistic; and
- Targets should be objectively measurable, so that progress can be assessed.

Ideally, targets should be in line with the goals set by the World Summit on the Information Society (WSIS) process in support of the Millennium Development Goals (MDGs). These are discussed in [Section 1.5.1](#). The recommendations from the Economic Community of West African States (ECOWAS) [1] cite an example of specific goals set on a regional basis by regulators.

While providing global and regional guidance, simply adopting general recommendations might not work for individual countries. The specific needs of each country will determine UAS goals and benchmarks. One country might set a feasible target of having a public phone in every community with more than 200 inhabitants for example, while another, such as Uganda, might wish to set a target of having one public phone for 2500 inhabitants. The same applies to Internet related targets and broadband.

Once achieved, new UAS targets can be set for the next phase of UAS. Thus, UAS targets for a particular country can be developed using the following general criteria:

- The current state of the sector and current levels of UA in the country;
- The resources available and required for achieving UA targets;
- Financial sustainability after implementation;
- The feasible quality of service (for uniform quality countrywide); and
- Planned periodic reviews in light of technological and market developments.

The UN Partnership on Measuring ICT for Development, set up after WSIS, established and defined a detailed set of forty core indicators, listed in *Partnership on Measuring ICT for Development: Core ICT Indicators* [2]. All countries that adopt these forty indicators are able to compare their status and progress to other countries'. For individual countries, these indicators are most valuable on a disaggregated basis so that the situation in different parts of the country or for different population groups is made clear.

END NOTES

1. See [ITU ICT Market Harmonization Project for ECOWAS/UEMOA](#) (ITU, September 2004).
2. www.itu.int/ITU-D/ict/partnership/

1.1.3 The scope of universal access and service

The scope of universal access and service (UAS) always includes telephony and the Internet, and increasingly broadband. In June 2009, France's highest court went as far as to declare that access to the Internet is a human right. In October 2009, the Finnish Ministry of Transport and Communications issued a decree that amended the definition of "universal service" to include access to a 1 MBit internet connection, in other words, access to a broadband Internet connection.

Radio and television broadcasting has traditionally not been included in UAS, but this is changing rapidly due to developments such as convergence, Internet broadcasting and broadcasters also offering Internet and telephony services (e.g., cable TV operators). Broadcasting policies and regulation typically have coverage requirements, though without specifics about actual access, whether by public means or for private subscribers.

The scope of UAS is often specified in detail to ensure that it is fit for purpose. It needs to be accessible and affordable as well as available. Features of UAS that might be specified include the following:

- Times of day when there is access to the service;
- Type of shelter for the terminals (e.g. secure building for a telecentre);
- Access to and usability of the terminal for people with physical disabilities;
- Convenience and pleasantness of location for all target groups of users (e.g., women might not wish to enter a bar to use a service);
- Quality of service (network reliability, fault repair times and call quality for telephony and prescribed down and upstream data rates for the Internet service).
- Payment methods (e.g., cash or prepaid cards) and for prepaid cards, availability of sales outlets; and
- Personal support for using the services.

Other services that are entering UAS policies include:

- Directories and directory enquiry services;
- Support services for Internet subscribers (e.g. help-lines, training);
- Emergency call answering facilities (dispatch of help for emergencies); and
- Special facilities to permit use by people with disabilities on par with all other facilities.

While mobile phones are now widely accepted as a way of providing telephony, and are also used to provide public access, and countries like France and Australia use their universal service policies to provide mobile coverage in rural areas, their inherent value of mobility has not, to date, been included in any countries' US definition. In Mexico, for example, there are both market and legal obstacles standing in the way of this step even though it has been suggested that wireless telephony has become the new norm. Including mobile services in US obligations is considered of national benefit by fostering UA to the Internet, as latest networks have data capabilities allowing basic Internet access [1].

Similarly, although text messages are popular and strongly appeal to poor people because of their relatively low and fixed (per message) price, they are not yet required in US obligations (USOs). However, text messages are sometimes required to be included in UA obligations, where public phones are operated by people (e.g. village phones) who can help users with texting. The scenario of excluding text messages from US policy could change specifically for services geared towards people with disabilities (e.g., the hearing impaired will use text messages but not voice calls).

END NOTES

1. See *Moving targets: Introducing mobility into universal service obligations* (Patrick Burkart), pages 164-178 of Telecommunications Policy 31, 2007.

1.1.4 Choosing services for inclusion in the universal access and service scope

The services to be included in the scope of universal and service access (UAS) will change as technology and society change. Because of this, in 2002, the European Union (EU) built into the EU Universal Service Directive a requirement that the scope of universal service (US) obligations be reviewed every three years. To be included in the scope of a UAS policy, a service has to satisfy two tests:

- In the light of social, economic and technological developments, has the ability to use the service become essential for social inclusion; and
- Are normal commercial forces unable to make the service available for all to use?

The scope of US in the EU was originally confined to telephony at a fixed location for voice calls, fax calls and data calls (for narrowband Internet using dial-up). The first review of the scope took place in 2006. Two services, mobile telephony and broadband Internet were new candidates for addition to the US's scope.

After consultation, reported in *Communication on Report regarding the outcome of the Review of the Scope of Universal Service*, neither mobile telephony or broadband Internet, was added for the following reasons:

- Mobile telephony passed the first requirement—ability to use a mobile phone is now seen as essential for social inclusion in Europe—however, normal commercial forces had led to widespread availability and use of mobile phones, so the balance of opinion was that

there was no need for regulatory intervention to achieve universal mobile service;

- Broadband Internet, on the other hand, failed the first test—well under half of European households subscribe to broadband Internet and currently it isn't seen as essential for social inclusion. Therefore, the second test was not applied.

In 2008, broadband Internet is defined by the ITU and OECD as always on service with download speeds equal or faster than 256 Kbps. The Federal Communications Commission (FCC) of the United States defines broadband as 768 kbps or faster. Broadband speeds develop rapidly: in 2004 the average advertised broadband speeds were typically 2 Mbps in OECD countries, while this increased to almost 9 Mbps in 2007. However, the European Commission finds that actual download speeds are between 144 and 512 kbps in rural areas and 1 Mbps in urban areas in the years 2004 and 2005. Despite not including broadband into the scope of universal service, the EU is very active in promoting and expanding broadband take-up and in providing access to above minimum download speed broadband also in rural areas for quality of life, social inclusion and economic-strategic reasons. The European Commission believes all Europeans need broadband access [1]. Finland may be leading the way in Europe to including broadband internet access in the definition of "universal service". In October 2009, the Finnish Ministry of Transport and Communications issued a decree that amended the definition of "universal service" to include access to an Internet connection featuring a download rate of at least 1 Mbps.

For developing countries, modified forms of this general test regarding which services to include into the UAS scope might be preferred. The main driver for UAS may be economic before social factors come to the fore, so policy makers in developing countries could ask the following questions:

- In light of economic, social, and technological developments, has the ability to use the service become essential for uniform countrywide economic development or social inclusion; and
- Are normal commercial forces unable to make the service available for all to use, within a timescale consistent with the contribution of the service that will meet the Millennium Development Goals?

If the answer to the first question is affirmative, then UAS goals should be set for the service. Social research can help clarify what has become a new social norm. This might be, for example, the greatest distance that it is reasonable for people to travel in order to use phones or the Internet. The Practice Note *Finding out what the necessities of life are and how many people lack them* shows one approach to social research used in the UK.

If, in addition, the answer to the second question is affirmative, and normal commercial forces cannot guarantee that the goals are achieved soon enough, then regulatory intervention is needed. Later chapters of this module discuss effective forms of regulatory intervention.

These test questions relate specifically to whether a service can be accessed by everyone. They refer to uniform countrywide economic development, not just to a country's general economic development. A service such as broadband Internet might be essential to the overall economic development of a developing country [2]. But while uniform countrywide economic development is desirable, it is rarely regarded as essential on the same time scale as the overall economic development of the country.

END NOTES

1. Broadband growth and policies in OECD countries, OECD 2008
2. For discussions of the role of broadband in economic development see [Information Economy Report 2006: The development perspective](#) (UNCTAD, 2006).

1.1.5 Targeting special assistance

Providing special assistance to specific groups that are considered to be in need of support, is typically related to universal service (US), not to universal access (UA). UA aims to make a service available and affordable in poorly served areas, and uses public, community or shared access. Often the rural and remote areas requiring assistance can be identified by examining wireline and wireless coverage.

All subsidies for US should be focused. This view accords with both economic theory and common sense; subsidising a large population group will always subsidise some people who do not need help, and thereby reduce the amount that is available for people who do need help. However, focusing subsidies has costs as well as benefits, and it may be desirable to avoid formal eligibility tests that may effectively exclude many people that the subsidies are intended to help. Also, providing individual end-user subsidies comes with administrative costs.

Subsidies focused on specific groups of people are intended to make a service accessible and affordable, particularly to citizens with low incomes. When focussing subsidies, policymakers and regulators need to ask the question, "Which group is likely to justify special assistance through subsidies?" The answer to this question is those who are in need, but what does this mean?

In many countries, elderly people or those with disabilities are thought to justify special assistance. Other populations sometimes thought to justify special assistance include:

- Women, who, in some developing countries, often have lower incomes and social obstacles which exclude full use of communications;

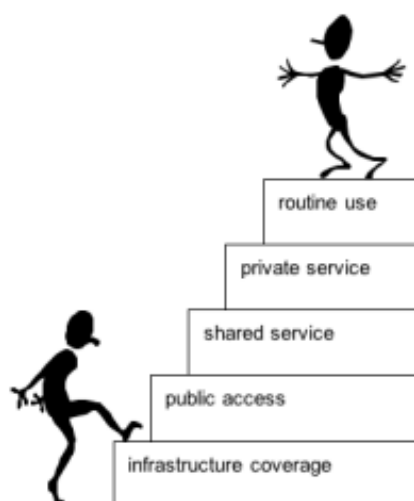
- Ethnic communities who have traditionally suffered from discrimination or neglect. When these people live in poorly served areas, these areas may get extra priority for UA;
- Unemployed people, for whom Internet access can provide new skills, networking capabilities, or knowledge leading to employment;
- Young people, who usually have low or no income but who are often early adopters of new technologies and can easily learn to make the most of them for the wider benefit of their families and eventually society; and
- War veterans or others felt to deserve recognition of national service. Veterans are often singled out in former Communist economies.

Each country must decide which, if any, groups justify assistance and for which services. Again, the decision needs to be guided by current service penetration, by financial resources necessary, and by financial sustainability. It is recommended that most countries should probably not provide assistance to particular people for a service until the service has achieved reasonable take-up (e.g., over 75 per cent) among the greater population.

1.1.6 User communications capabilities

In addition to physical infrastructure, certain levels of types of service (e.g. public, shared or private) and user communications capabilities are required to progress ICT usage. In fact, as the figure below shows, there is a relation in terms of available access and service use.

Figure: Steps in developing communications capability



Source: ITU-infoDev ICT Regulation Toolkit – UA Module

A routine user typically uses a service as a matter of course whenever it is valuable in daily life and not just in exceptional circumstances or emergencies. To become routine users, most people need the convenience of private service that will only be acquired if the service is accessible and affordable.

The progression from infrastructure coverage to routine use is applicable to the Internet, as well as to telephony. However, there is an important difference between the telephony and Internet staircases—no special skill or education is needed to use phones, while using the Internet effectively needs certain levels of literacy and practice as well as other skills (e.g., use of software, knowledge of foreign language, etc.).

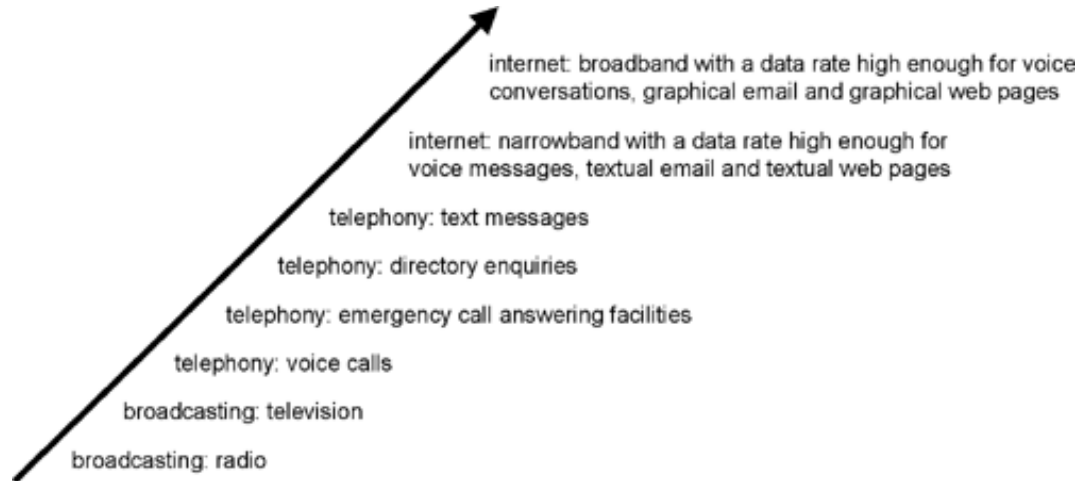
Broadly speaking, most people need or want affordable telephone service, however, the same is not always true for the Internet. Even in developed countries, sizable proportions of the population do not want to use the Internet for a variety of reasons. The skills needed to use the Internet seem to come much more easily to younger people, and older people sometimes lack both interest and skills. However, more importantly, in developing countries, with lower educational levels and less relevant content, there are more barriers for people to use the Internet, even where it is accessible and affordable. Universal access (UA) programmes for the Internet are therefore often far behind those for telephony.

Many countries do want goals for universal access and service (UAS) for both telephony and Internet (and even for broadband Internet), recognizing the potential of enhanced and ubiquitous ICT services for social and economic development. Tracking progress across all of these goals becomes increasingly complex. A possible new approach for tracking progress that focuses on people's capabilities to use the technologies, rather than on the underlying infrastructure, is described in the Practice Note *Communications capability profiles*.

1.1.7 Regulatory intervention for universal access and service

Telecommunications markets are dynamic; new technologies are constantly emerging, and new services rapidly become popular and then indispensable. So, universal access and service (UAS) aspirations are likely to rise over time. This is illustrated in the figure below.

Figure: Possible rising aspirations for ICTs



Source: ITU-infoDev ICT Regulation Toolkit – UAS Module

With liberalization and effective regulation, normal commercial forces are more likely to be capable of fulfilling some, if not all, of the new aspirations. So it is not obvious whether more or less regulatory intervention will be needed as aspirations rise.

Universal Service Obligations (USOs) have been a form of regulatory intervention for achieving universal service (US). The future of USOs is a topic for debate among stakeholders in developed countries, as represented by the OECD and the EU [1]. Some believe that USOs will soon be both impracticable and unnecessary, while others see them as more important than ever in an era when universal broadband access could contribute significantly to mitigating climate change and its effects. The outcome of this debate will differ from country to country, depending on political factors as well as on the need for, and supply of, communications services.

For developing countries, a parallel debate will take place, with an equally uncertain outcome. Industry stakeholders like the GSM Association (GSMA) argue forcefully for regulators to stand aside and allow the markets to stimulate and fulfil demand for new services. At the same time, ICTs are a vital tool for development in sectors such as health and education that are usually understood to be commercially unviable and that need central government support. This toolkit aims to help policymakers and regulators in developing countries make informed decisions about the scope of UAS and regulatory intervention in their own countries.

END NOTES

1. For contributions to the debate in the EU, see [List of comments on the Communication "On the Review of the Scope of Universal Service in accordance with Article 15 of Directive 2002/22/EC", COM \(2005\) 203, submitted in response to the public consultation \(EU\).](#)

1.2 Current status of universal access by world regions

In [Section 1.1.1](#), Universal access (UA) and universal service (US) were defined in terms of availability, accessibility and affordability. This section explores these concepts in more detail and with practical illustrations, while at the same time summarizes the status of UA or US by world regions.

For most developing countries, the availability of telephony is understood primarily as mobile coverage. In almost every country of every region, mobile service has reached a greater level of penetration and, in most developing countries and emerging markets, a greater level of population coverage than fixed networks. Figures for this are discussed in [Section 1.2.1](#).

The accessibility and affordability of telephone service have been improved by innovations in the mobile industry, such as prepayment (which does not need a monthly subscription, a bank account and regular income) and low-denomination refill or scratch cards (which allow poorer people to buy smaller amounts of telephone service). Interestingly, none of these innovations has to do with the actual price of a mobile call, which is still more expensive than fixed services in most countries, but rather with the packaging of services. Various other ICT service providers follow this approach, e.g., by offering prepaid Internet access or fixed voice services. [Section 1.2.2](#) describes the ways in which mobile phones have become more affordable and accessible.

However, affordability analyses show that even with cheap phones and very low entry-price tariffs, a significant portion of householders in rural areas may still need public access phones as they are too poor to pay for their own phone. [Section 1.2.3](#) outlines various forms of public access using mobile phones designed to meet this need.

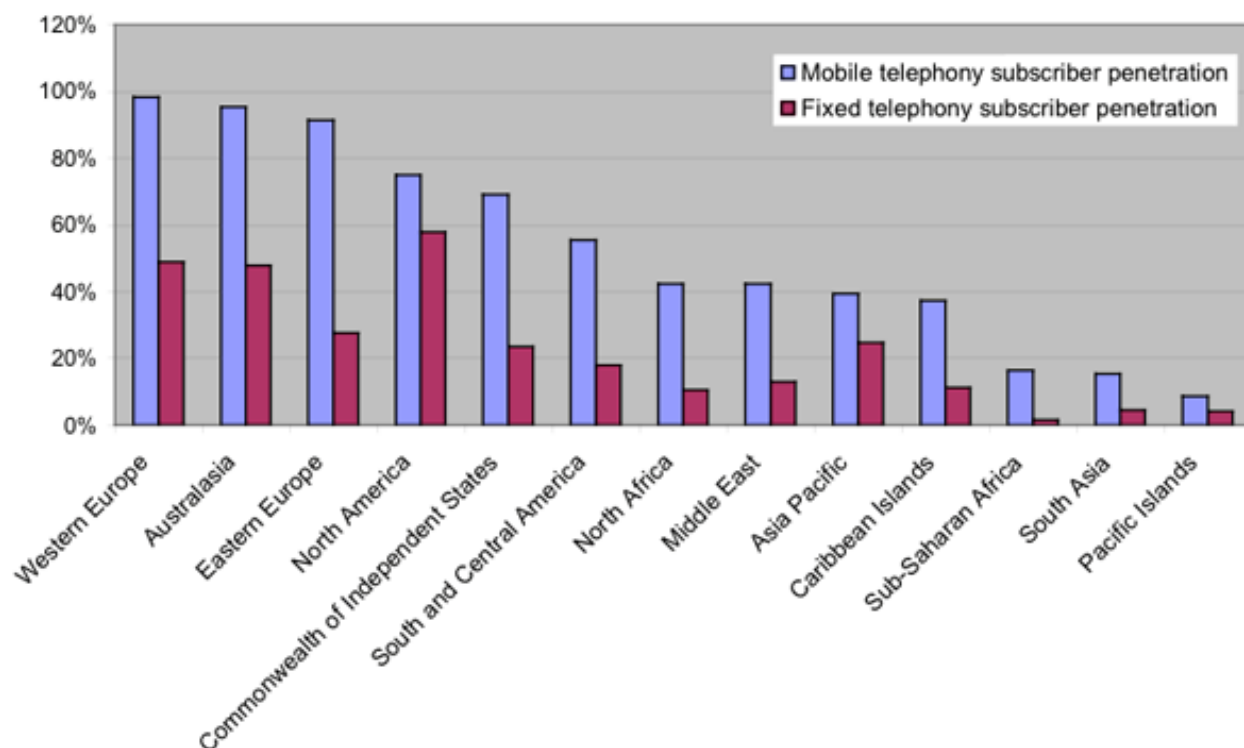
[Section 1.2.4](#) provides figures on Internet subscriber and user penetration, Internet costs and broadband development. Internet use is much slower to develop than telephony use. It has higher barriers in regards to literacy in general and computer literacy in particular, cost of required terminal equipment (i.e., the personal computer) and useful content, support and maintenance. Universal Internet access therefore needs to overcome these barriers, besides ensuring the development of infrastructure (international and national backbone) and public access Internet centres, such as telecentres. [Section 1.2.5](#) outlines various forms of public access Internet centre.

Finally, [Section 1.2.6](#) provides a brief summary of broadcasting equipment penetration for comparison with the Internet.

1.2.1 Availability of telephone services

For most developing countries today, the availability of telephony is primarily through mobile coverage. Mobile service has reached a greater level of penetration than fixed networks in almost every country and region worldwide; in most developing countries and emerging markets, more of the population is covered by mobile than fixed networks. In 2002, mobile penetration overtook fixed penetration in the world as a whole. This phenomenal change is illustrated in the figure below, and must be recognized as an opportunity for the more rapid achievement of universal access and service (UAS) than was thought possible even a decade ago.

Figure: Mobile and fixed telephony subscriber penetrations by region, 2006



Source: ITU World Telecommunication/ICT Indicators Database

The commercial development of mobile networks is doing much to provide a platform for UAS in the developing world. ITU reported that approximately 70 per cent of the world's population was covered by mobile wireless signals at the end of 2005 and over 82 per cent at the end of 2007 [1]. A study estimated that this number would reach at least 90 per cent by 2011. The 2006 study found that 38 European countries have achieved over 95 per cent population coverage and typically 90 per cent geographical coverage. Even the least developed world region, Africa, had at least ten countries with greater than 90 per cent population coverage, with a further eight countries having over 70 per cent population coverage. Africa's total population coverage was 60 per cent and its geographical coverage less than 30 per cent [2].

While in 2006, 80 per cent of the world's population was covered by mobile wireless signals, less than 50 per cent were subscribers. Though the coverage might show the availability of the service, it does not show the accessibility and affordability, which are looked at in [Section 1.2.2](#).

END NOTES

1. ITU World Telecommunication/ ICT Indicators Database
2. See [Universal Access: How Mobile can bring communications to all](#) (GSMA, 2006).

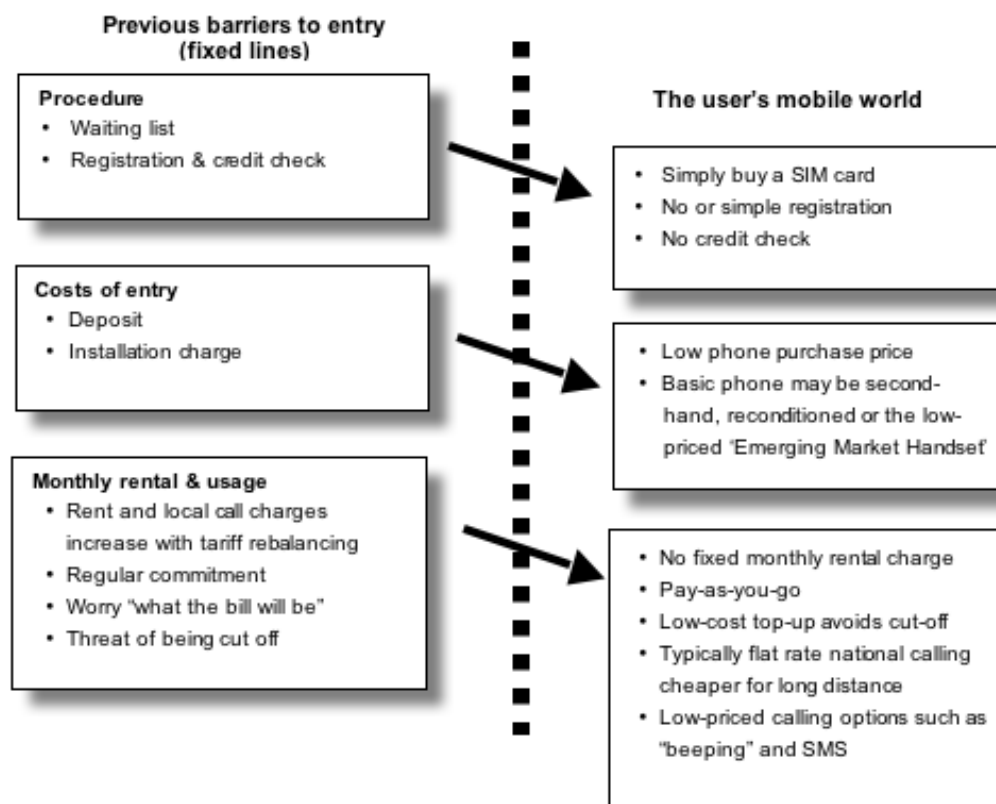
1.2.2 Accessibility and affordability of telephone services

Service take-up by low-income users depends on the removal of both price and non-price barriers.

Removing non-price barriers

Mobile services have become popular in developing countries primarily because barriers to service-take up have been removed and new service features making the service more accessible have been introduced. Features that make mobile service more attractive to individuals wanting private service are shown in the figure below.

Figure: The use of mobile phones to remove barriers to private service



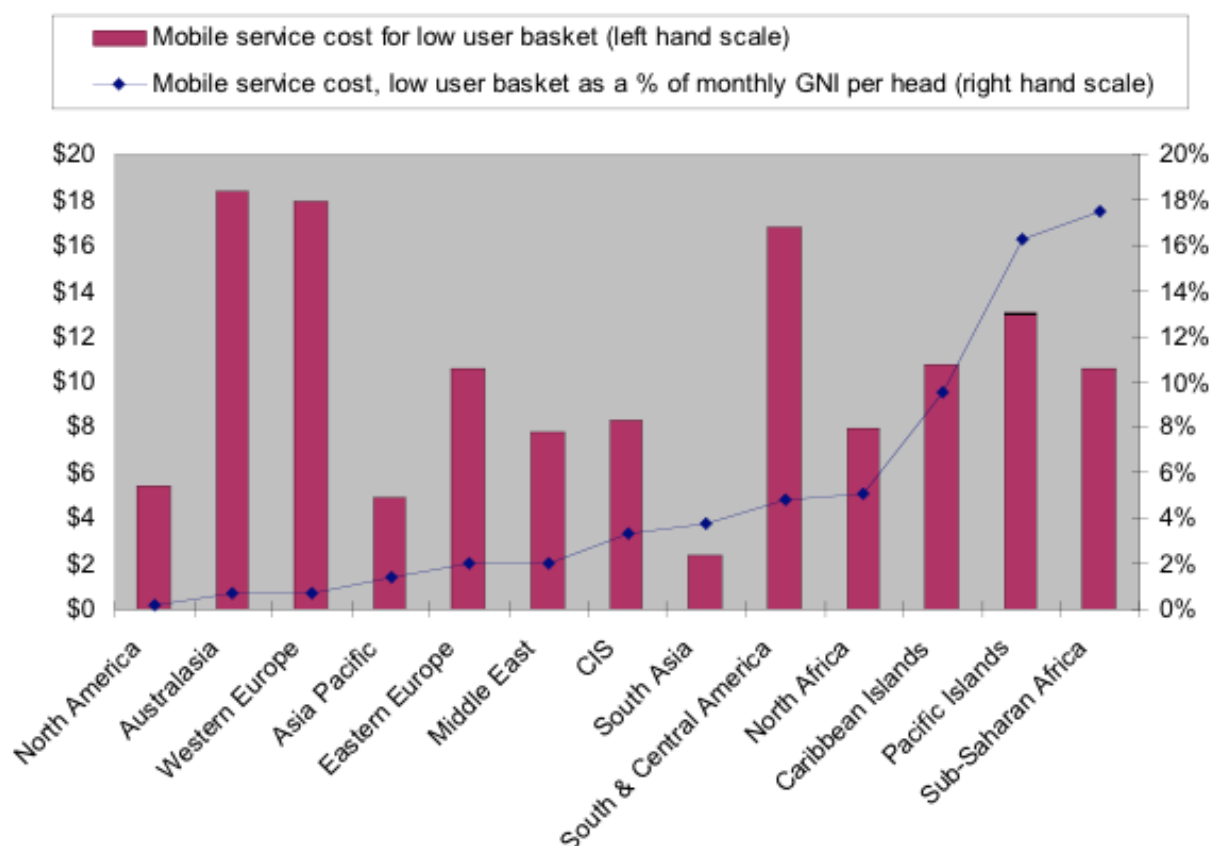
Source: Universal Access: How Mobile can bring communications to all (GSMA, 2006).

All of these features are available in most developing countries. Interestingly, some wireline operators and ISPs have copied a number of these features successfully. Fixed network operators may offer prepaid accounts, and ISPs offer prepaid scratch cards. Also, technological developments and market forces have brought significant price reductions to phone service. With all of these trends, the barriers impeding private service for low-income people within mobile coverage are being significantly reduced.

Removing price barriers and increasing penetration

The cost of private telephone service and routine use may still be too high for a considerable number of people in developing countries. The following figure shows the monthly cost of mobile phone usage on a regional average basis, using the first OECD low user basket measure that includes 25 90-second mobile calls, and 30 text messages per month. This illustrates that people in sub-Saharan Africa would need to spend 17 per cent of the Gross National Income (GNI) per head to be considered low level users in the context of developed countries. However, this is based on a low-usage basket oriented to the norms of low-usage in the developed world. The figure below demonstrates that in several regions, expenditure on mobile telephony costs would be about four per cent of GNI per head, whereas in most developed countries, the equivalent level of usage would cost less than one per cent of GNI per head. It is important to note that personal income is usually less than the GNI, which includes various corporate money flows.

Figure: Mobile telephony costs by region, 2006



Source: ITU World Telecommunication/ICT Indicators Database

Operators and policy makers recognize the social, economic and commercial value of private ownership and improved market penetration, even in low-income countries and at very low levels of usage (well below the OECD expectation for low usage). Operators recognize that if they offer very low entry-price tariff schemes that enable low-income users to become subscribers and stay connected, the users will potentially receive more calls than they originate; this factor contributes significantly to increased commercial viability. Thus, the majority of operators in developing countries offer low-priced access tariff schemes which allow subscribers to stay connected even if the subscribers make only a few outgoing calls.

Research into the minimum amount a subscriber has to spend on usage to be prevented from being disconnected by the operator due to inactivity for 61 operators, almost half of which were from developing countries, revealed that the minimum required usage was less than USD 2 per month, and in most of the developing country cases, the amount was even below this [1]. Although these tariffs could result in some users spending an average of only 17 per cent of the surveyed operators' Average Revenue Per User (ARPU), the operators are prepared to allow users to remain as subscribers at these levels. In many cases, these subscribers are receiving calls from friends and relatives that far exceed the expenditures they make directly.

The trends are for these lowest available entry-level prices, pertaining to network access alone, to become even lower, and for users to be able to replenish their prepaid accounts with very small denomination refills. This obviously increases the potential that low-income people may become and remain subscribers.

An analysis of household incomes in developing countries and observed demand, indicates that once service becomes available geographically and is offered on least entry-price terms, the majority of users can afford the monthly costs of staying connected and will make a minimal number of calls. The level of affordability may extend beyond 90 per cent of households even in low-income countries, though for various reasons the actual penetrations still remain below this figure [2].

With strong encouragement from service providers, equipment vendors have been developing low-cost mobile phones. In 2007, 2G phones were available for as little as 30 USD, and 3G phones were available for 130 USD. The 30 USD price for an individual mobile phone is still too much for at least 1 billion people, so some mobile phones are now being designed for sharing. See also [Section 8.4.1](#).

END NOTES

1. See [Universal Access: How Mobile can bring communications to all](#) (GSMA, 2006).
2. For a discussion of the constraints on extending private service, and of appropriate actions by regulators, see [Telecoms demand: measures for improving affordability in developing countries - A toolkit for action](#) (Claire Milne and others, LSE, January 2006).

1.2.3 Public access to telephone services

Network operators can tolerate low Average Revenue Per User (ARPU) from some users however affordability analyses show that even with cheap phones and very low entry-price tariffs, a significant portion of households in rural areas may still need public access phones [1]. These services may be formalized public phones or informal shared access and street-side or village reseller businesses.

The reasons why people need public access phones include the following:

- The cost of phones or entry-price private access tariffs may still be too high for some individuals or households;
- A number of users who are physically or intellectually challenged, pre-literate, or otherwise impaired, may need a human intermediary to assist them with accessing the service;
- Some people prefer to use private phones mainly for incoming calls and to make outgoing calls at public telephones because some volume-discounted tariff schemes allow public access providers to offer calls at a lower per-minute price than private users have to pay; and
- Emergencies may occur when a private phone is not available.

Public phones or shared access phones, managed by individual service providers or resellers, will continue to remain important for those without private service, or with challenges, for some time to come.

Formal and informal shared usage and airtime resale businesses emerge virtually everywhere mobile networks exist. These may be phone kiosks, simple public phones offered on the street, often with only a small chair, an umbrella for weather protection, and operated by individuals, often women (phone ladies or umbrella people), and operator branded outlets. Informal resellers have led the way, or at least moved in parallel with more formal institutional phone reselling establishments, to provide public access in both urban and rural areas.

In all world regions, there are many variations of and approaches to public access with new ones emerging constantly. A sample of some of the public telephony models that currently exist appears in the table below.

Types of Mobile Public Access		
Type	Description	Example
Unmanned coin- or card-operated public phone box or cabin	Often managed by the main fixed-line incumbent operator	Telus Canada, Deutsche Telekom, British Telecom, etc.
Micro-credit led community phones	Micro-Finance Institutions members assume loan in exchange for mobile phone kit	Grameen Village Phone (VP), MTN Uganda VP, Rwanda VP
Mobile Payphones	Payphone deployment to further universal access objectives and obligations	Vodacom and MTN South Africa, MTN Uganda
Entrepreneurial locally-owned and operated Public Call Offices (PCO)	Micro-entrepreneur provides public access to existing networks	Celtel Burkina Faso, MTN Nigeria, MTN Nigeria umbrella ladies
Independent companies	Private company provides public access to existing networks	OnePhone Mozambique, Fones4U Botswana, Smile Communications South Africa
Company initiated public phones	Mobile operator offers direct phone reseller opportunities to local people	Spice Telecom, India
The GSMA shared phone and shared-phone software initiative	Using various terminal types, including low-cost phones, the GSMA is linking up with a number of operators to help streamline the model, lower costs and broaden the deployment of public access	Shared access pilots are taking place in South Africa, Nigeria, Kenya, India and Albania
VoIP telecentre services	Generally co-located with cybercafés	

Source: Adapted from *Universal Access: How Mobile can bring communications to all* (GSMA, 2006).

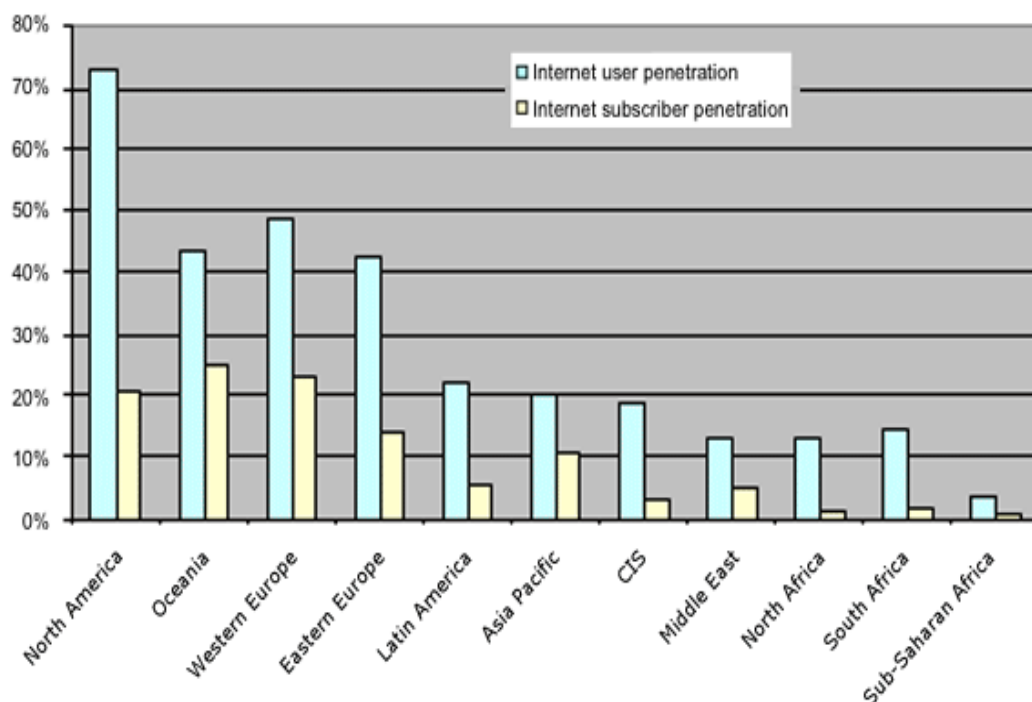
END NOTES

1. [1] For an account of techniques used to make telephone service affordable, and of the limits to their success, see [Telecoms demand: measures for improving affordability in developing countries - A toolkit for action](#) (Claire Milne and others, LSE, January 2006).

1.2.4 Internet usage

As described in [Section 1.1.6](#), Internet penetration is significantly slower to develop than telephony. Internet take-up is constrained by developments such as the availability of low-cost personal computers or similar user terminals, wide-spread electrical power to run computers, public education aimed at improving Internet literacy and relevant Internet content, applications and services such as those provided by e-government initiatives (see [Section 1.6.2](#)), as well as others. The figure below summarizes Internet subscriber and user penetration in 2006.

Figure: Internet subscriber and Internet user penetrations by region, 2006

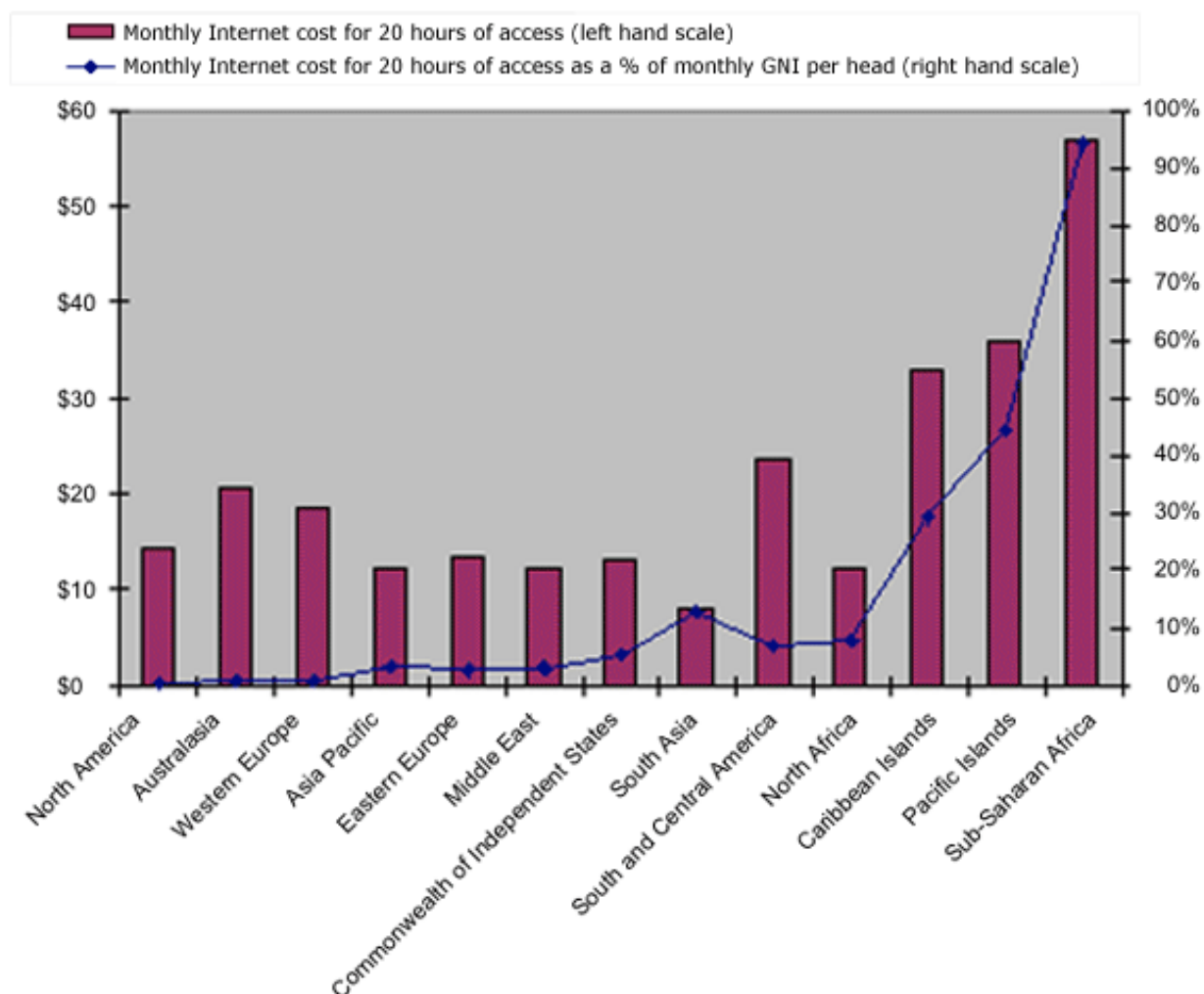


Source: ITU World Telecommunication/ICT Indicators Database

Data of the number of Internet users is not readily available in many countries. The most reliable source of information on this indicator is surveys, and in Europe and East Asia they provide solid evidence of the state of Internet penetration. However, the data is not obtained in consistent ways in different countries, and is often estimated based on the number of Internet Service Providers (ISPs) and the number of users per subscriber. Even allowing for this, the ratio of user penetration to subscriber penetration varies a great deal regionally. In developed countries, where the cost of Internet access is relatively low, the ratio is typically around 2:1 and in countries with low incomes or higher prices, the ratio is considerably higher (between 3:1 and 10:1, for example) as many more users share single subscriptions.

The figure below summarizes costs to users of a total of 20 hours of household Internet access using the cheapest available method (narrowband or broadband). There is generally an inverse relationship between penetration and cost. Sub-Saharan Africa, for example, has very high costs and very low penetrations.

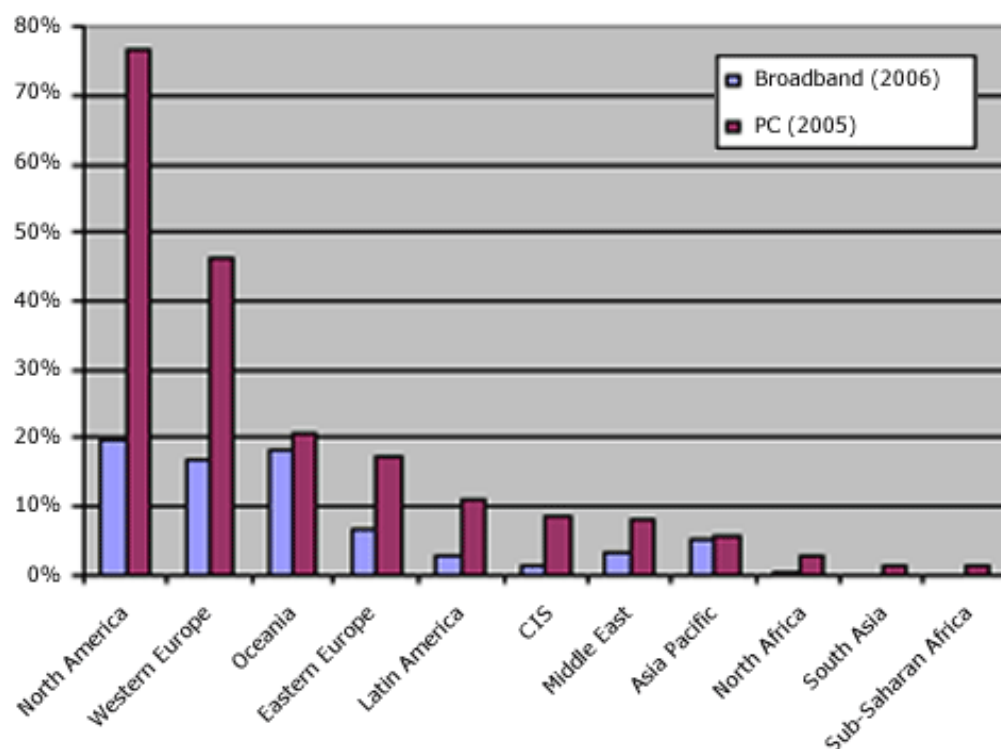
Figure: Monthly Internet costs by region, 2006



Source: ITU World Telecommunication/ICT Indicators Database

In 2006, broadband penetration reached approximately 20 per cent in North America. Western Europe had above 15 per cent penetration, as has Oceania. In all other regions broadband penetration average was still below 10 per cent, as shown in the figure below.

Figure: PC and broadband penetration



Source: ITU World Telecommunication/ICT Indicators Database

1.2.5 Public access to Internet services

As in the case of telephony, forms of public Internet access are essential at the community level for social and economic development.

All continents have multiple public points of Internet access, which have been developed through policy, private entrepreneurship and other public initiatives designed to overcome the barriers for Internet access. These access points range from purely commercial cyber-café, to non-profit or publicly funded telecentres and may consist of small public Internet access points with one to four computers (many hundreds of these access points have been established through universal access and service funds [UASFs] on semi-commercial or non-profit bases) to large multi-purpose community telecentres, most of which have been financed separately through aid agency activities and agreements.

The table below summarizes a survey of such models in Latin America. While there is a lot of information on classifications of telecentres, case studies and best practice, there is little comprehensive data that give an overview of the numbers of public access Internet centres by world region.

Type	Services	Management-Administration	Examples
Commercial	The basic service is computer plus Internet connection. Called a cybercafé when a cafeteria or bar is present, but these other services generate only a small part of the income (<20%).	Private business	Cabinas Publicas in Peru, cybercafés in Bolivia, Argentina and elsewhere; E-Choupal in India.
Franchise	Seeks to stand out by improved quality, faster connection, more and better services, atmosphere and comfort.	Private business	There were examples in Latin America and Africa, however, they have ceased to exist, as the low margins of Internet cafes make a franchise model challenging. In India, Akshaya uses a public-private partnership, franchise model.
NGO	Wide diversity of services, orientation, and target	NGO or development	CDI (Brazil), El Encuentro (Chile), LINCOS

	group, depending on location and orientation of promoting institution. Services include Internet combined with training and development activities. Hours of Internet may be subordinated to use of machines for other uses by NGO staff.	project (dependent on grants from private businesses for initial computers and software)	(Costa Rica), AEDES (Cotahuasi, Perú), Gemas da Terra Rural telecentres (Brazil), Infoplazas (Panama), MS Swaminathan Research Foundation Village Knowledge Centres (India).
University	Many terminals (30 to 100) mainly for students but also available to general public. Specialized technical support available. Academic courses in computers and preparation of contents easy to organize.	University	Universidad Nacional San Agustín (UNSA), Universidad San Antonio Abad del Cusco (UNSAAC)
School	The school opens its doors to the community after class hours. Services tend to be many and varied (Internet, e-mail, content preparation). Most suited are e-literacy programmes and continuing education.	School	Leo Ussak (Canadian Arctic), Casi (Uruguay), Fundacion Omar Dengo (Costa Rica)
Municipal/State	In principle, can include a wide range of services (public and private).	Municipal government directly, in partnership with other entities, or entrusted to private enterprise	Infoplazas in Pedací and Penonomé (Panamá), Amic@s (Paraguay), Sao Paulo Acesa (Brazil), Pirai Digital Project (Brazil), IT clubs (Egypt), Gyandoot (India), e-Sri Lanka
Multipurpose	Rural: Access to Internet, e-mail and related services. Commercial web hosting to community, telephone booths, sales of working materials and stationery, Internet café, training courses.	Administrative board representing donors, service suppliers and community members	LINCOS (Costa Rica), Joven Club de Computacion (Cuba), Puntos de Acceso (Venezuela), GESAC (Brazil), Compartel (Colombia), UNESCO Community Multimedia Centres (Mali, Uruguay and elsewhere).

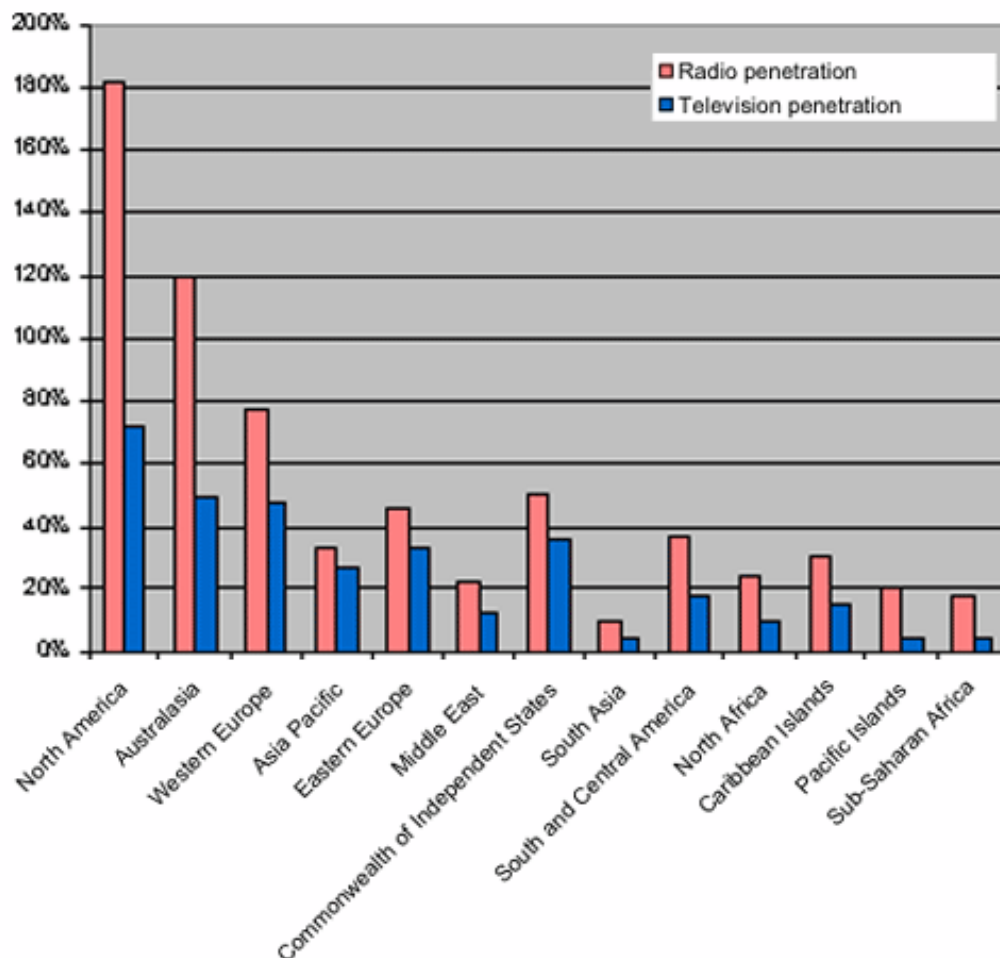
Source: *Adapted from Telecentres for Socioeconomic and Rural Development in Latin America and the Caribbean* (Francisco Proenza and others, IADB, May 2001).

1.2.6 Broadcasting usage

Traditionally, broadcasting has not been a part of universal access and service (UAS), but is now regarded as part of ICTs, in particular as the underlying technologies and delivery mechanism between telecommunications and broadcasting are converging. First models of how to include broadcasting in UAS policies are explored.

Interestingly, there are fewer radio and television than telephony subscriptions in many regions of the world. In some cases this is due to the fact that free-to-air radio and TV does not require subscriptions, and the number of actual radio and TV users is much higher than subscription numbers imply. These numbers might increase as people take up phones that also support mobile radio or television services. The number of radios is higher than the number of televisions by a factor of two in many regions of the world, and the number of televisions is much higher than the number of personal computers in regions made up of developing countries. The figure below summarizes the numbers of radios, televisions and personal computers by region.

Figure: radio, television and personal computer penetration by region, 2003



Source: CIA Fact Book

While broadcasting has been available for much longer than the Internet, figures for usage of broadcasting are not always comparable between countries because in many countries the numbers of radios relate only to stand-alone radios (not to radios incorporated in other equipment such as cars) and the numbers of subscribers may not account fully for free-to-air users.

1.3 Rationale for a universal access policy

[Section 1.2](#) illustrates that although great strides have been made in universal access and service (UAS), the objectives of access and service for both telephony and the Internet have not yet been achieved. In that context, this section examines why there is a need for UAS policy.

The main arguments for a UAS policy are the following:

- **ICTs are social and economic enablers.** ICTs are increasingly used in all sectors of economies. In many regions, economic activity is shifting away from agriculture and industry to services sectors, and towards the new information economy and society. The ICT sector is considered to be a significant engine of growth for economies. This is elaborated in [Section 1.3.1](#).
- **Supply and demand increases the importance of UAS policy.** Interestingly, the increased supply of ICTs through rapid technological developments and base of pyramid marketing, actually fuels the requirement for UA. Mobile phones, not too long ago considered luxury items and out of reach for most, are now providing the main access to voice service for the majority of people in many countries, making it more urgent that the population without access be provided with access to phone service. Similarly, for large parts of populations work and life without the Internet is unthinkable, and ever more megabyte-rich applications require increased broadband development. The more ICTs are used, the more there is a dependence upon them, which in turn makes it more essential that all citizens have access to ICTs. This is explained in [Section 1.3.2](#).
- **Market gaps can remain in place.** While it has been demonstrated that market forces, after liberalization and sector reform, have had the greatest impact on improvement of UAS in many developing countries, for various reasons market gaps can remain in place. Some countries, for example, have exceptionally challenging geographic characteristics combined with extremely low population densities (e.g., Mongolia and Botswana) or isolation (e.g., many islands in the Pacific region) or extreme poverty, which make UAS

tremendously challenging. In other countries, the market might be able to achieve UAS, but the timeframe in which this could be obtained, might be considered too long.

- **Monitoring UAS and updating it.** Constant change in technology, services, and pervasiveness of various ICT services makes it necessary that the status of UAS should be monitored and policies continue to be updated and developed. Also, there are countries where the market can achieve UAS, but there is a need for public oversight to confirm that it has been achieved, to improve regulation, and to continually review the concept of what is considered UAS.

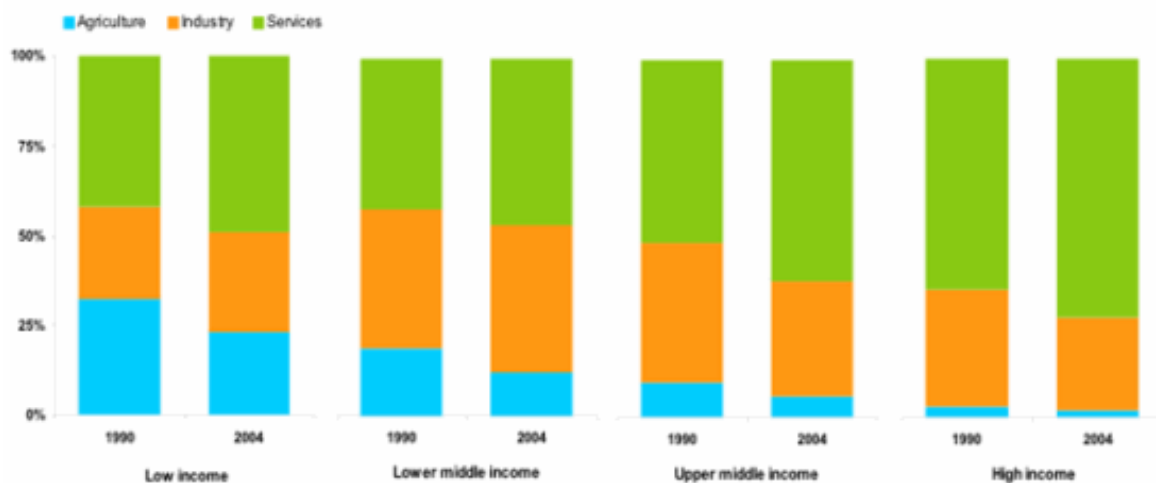
Market gaps and the need to monitor UAS are presented in [Section 1.3.3](#).

1.3.1 ICTs as social and economic enablers

Over the past decade the role of ICTs in all economies has become critical. The move towards an Information Society is distinguished by the following characteristics:

- **Growing dependence on ICTs.** As ICTs become more pervasive in business and personal contexts, people become more dependent on them for their livelihoods and for fulfilling their social and recreational needs. Being unable to access or use ICTs can become a serious deprivation;
- **Growing ICT sectors.** The provision of ICTs and related services forms a sizeable sector of many economies. Increasingly, developing countries are introducing high-level ICT strategies that aim to develop this sector of their own economies as well as using ICT as a tool in other sectors. One study for a mobile network operator has suggested that a 10 per cent increase in mobile penetration in a country can grow the gross domestic product by 0.6 per cent [\[1\]](#); and
- **More use of ICTs.** Economic development and growth entail a shift in the proportions of national output, away from the primary sector of agriculture, through the secondary and tertiary sectors of industry and services, towards the new information economy. The services sector has become increasingly ICT-intensive, and the knowledge sector is largely dependent on ICTs. ICTs enhance productivity across all sectors, including government. The figure below illustrates the shift for the three traditional main output sectors—agriculture, industry and service sectors—for countries at different income levels.

Figure: Percentage of total output by main economic sectors for countries at different income levels, 1990 and 2004



Source: World Bank Development Indicators 2006

END NOTES

1. See [Africa: The impact of mobile phones](#) (Vodafone, March 2005)

1.3.2 Drivers for universal access and service policy

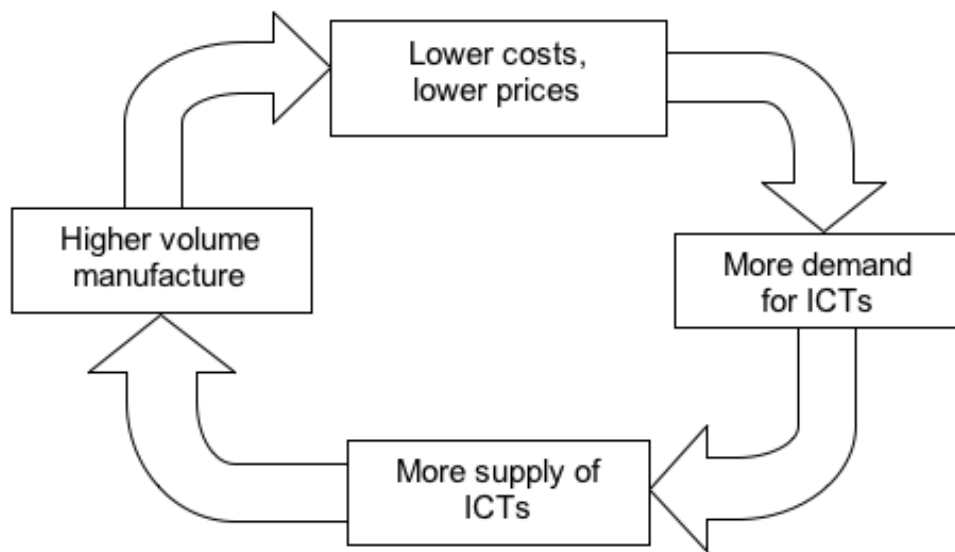
Several inter-related factors are now converging to increase the importance of universal access and service (UAS) policies for ICTs, in every country. There is high growth on both the supply and the demand sides of the sector, largely but not completely balanced through the market. In particular:

On the supply side:

- Rapid technology innovation and development has provided multiple options for communications, which are especially promising for Internet and broadband (especially wireless). [Chapter 8](#) explores what the implications are for UAS. These technological developments vary widely in maturity, capability, complexity, cost and economic scale for deployment. The suppliers of many of these

technologies are vying for opportunities to sell into emerging markets, creating a potential for a virtuous spiral of high volume manufacturing with corresponding cost savings, lower prices and further market expansion;

Figure: A virtuous spiral towards ICT growth



Source: ITU-infoDev ICT Regulation Toolkit – UA Module

- Base of pyramid marketing (selling low-cost goods and services to mass markets of low-income groups) is widely recognized for its significant commercial potential across many sectors as well as social impact, including communications. Many approaches and techniques are copied from one sector to another, e.g., the concept of single-use packages of a tangible item such as shampoo or sauce, has been copied by providers who will offer very small pre-paid phone top-up cards, costing USD 0.50 or less, and in some cases even a single phone call or a few text messages. This is also increasingly used in the context of Internet services, where one can purchase scratch cards which give passwords to enable Internet use in units of 10 minutes, 30 minutes, 1 hour etc.; and
- Liberalized telecommunications markets are becoming the norm in more countries; in markets where there are no barriers to the entry of providers, the boundaries of telecommunications and broadband coverage and the number of people served, are expanding further and faster than previously imagined possible.

On the demand side:

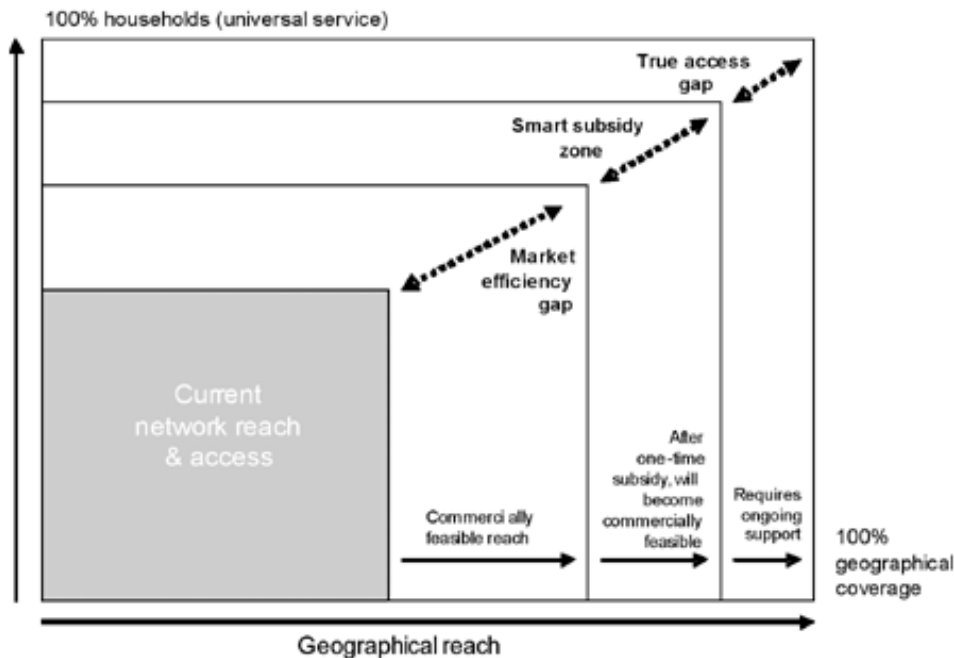
- Many people, who once would not have dreamed of using, let alone possessing telephones, can do so because phones have become both more available and more affordable. Citizens derive various personal and economic benefits from phone use, including being able to keep in touch with family (who are now often absent for work) and friends, and are especially useful in emergencies. The Economic Impact of Telecommunications on Rural Livelihoods and Poverty Reduction presents evidence of this;
- For many more people, however, telephones remain out of reach (physically, financially or both), although they would get similar benefits if they could—this has significant implications for UAS and represents vast untapped potential; and
- Public benefits for the society and the economy from wider telecommunications access are greater than, if not equal to, the personal benefits that citizens gain with access. E-government, agriculture and rural livelihoods, health, education and financial services can all promote economic and social development. Some of these benefits are discussed in [Section 1.6](#). A lesser-known example of how the public benefits from wider phone access is the spread of social support helplines. These provide support for callers, often abused children or adults seeking information or assistance.

1.3.3 Market gaps and universal access policy

Three separate zones exist within the so-called access gap, namely the market efficiency gap, the smart subsidy zone and the true access gap, as illustrated in the figure below. Each zone requires a distinctive set of policies and strategies which together yield an integrated universal access and service (UAS) programme.

There are also two dimensions to the challenge of achieving UAS: these are poverty and high-cost areas. Poverty, of course, exists in both urban and rural areas, however the cost of addressing both poverty and high-cost areas together, as exists in many rural settings, is much higher. Providing access to the urban poor is well within the reach of the market.

Figure: Distinctions within the access gap



Source: Initial concept in “Telecommunications & Information services for the Poor. Towards a Strategy for Universal Access”, by J. Navas-Sabater, A. Dymond, N. Juntunen, 2002. Modified by Intelcon.

The market efficiency gap is the gap between the service reach which can be achieved in a fully liberalized and efficient market and what is actually achieved by markets under existing conditions. This gap can be bridged through private service provision so long as the regulator and policymakers remove non-economic barriers, create enabling regulation, ensure a level playing field among all market participants and the create a positive fiscal, business and investment climate. This allows operators and service providers to be able to serve a much broader area and its inhabitants and thus close the market efficiency gap. This frontier can be reached within the context of telecommunications sector reform and does not require subsidies. Many countries are now doing very well in bridging this gap through effective competitive service provision. The only questions relate to how far the market can actually reach commercially, and how best to implement and sequence more pro-market conditions to reach the limits of the market. The theme of an effective liberalized market, together with the regulations needed to implement it, is discussed in detail in [Chapter 2](#).

The smart subsidy zone refers to rural or high cost areas, and low-income population groups that will not be reached by the market alone, even if it is an efficient market, or at least not for a long time to come. Targeted financial intervention beyond normal regulatory measures and incentives is required to provide services to these population groups and areas. A smart subsidy is the term used to describe an initial subsidy (usually given on a once-only basis) that is designed to be results-oriented, does not distort the market, and encourages cost minimization and growth of the market. It helps to kick start a project or service, with the ultimate objective of the programme becoming commercially viable, whereas without the subsidy investors might otherwise have been reluctant to invest. Investors' reluctance could be due to perceived risk or general lack of capital for the kind of service opportunities that are considered by government to be essential for socio-economic development. The important element of the smart subsidy zone is that an initial subsidy to private sector providers will make the project commercially viable on an ongoing basis by filling the financial gap with a one-time subsidy, which increases the operator's rate of return and reduces his risk. No further subsidies are needed if the service targets are set realistically, with medium term commercial viability in view. Targeted interventions are usually implemented using a Universal Access and Service Fund (UASF). [Section 5.3.8](#) recognizes that the extent of the smart subsidy zone is sometimes hard to predict and can be a moving target, as it is not uncommon that operators exceed expectations and close this gap.

The true access gap comprises areas or communications targets that are beyond commercial viability, even in instances where initial smart subsidies are given. Commercial sector operators or service providers serving these areas or population groups would need ongoing financial support, possibly in the form of operating subsidies (or end-user subsidies in the case of universal service [US]). It is a political decision if and to what extent to subsidize ongoing service provision to areas and population groups that are beyond the limits of the smart subsidy zone and whether or not to use UASFs to finance such operations. However, even the true access gap can sometimes be bridged with innovative commercially-related approaches. In some cases, true access gap areas can be combined with more profitable areas, without need for ongoing subsidy. Also, in most countries, the true access gap may, in fact, apply only to a small percentage of the total population.

In cases where the market is in fact achieving most UAS objectives, a degree of public oversight remains reassuring. It can make progress more visible, highlight any deficiencies and provide a safety net for unfortunate people or places not otherwise served. Constant change in technology, services, and pervasiveness of various ICT services makes it necessary that the status of UAS should be monitored and policies continue to be updated and developed.

In all cases, it is important to work with the market as it develops. This involves, for example:

- Consulting industry and the wider public on the details of UAS policy and its implementation, and taking views expressed into account, especially those that rest on practical experience;
- Ensuring that all market participants have the opportunity to contribute to UAS goals, and receive appropriate recognition when they do so;
- Reviewing policies and practices regularly to keep pace with market and technological developments; and
- Wherever practicable, incorporating competitive mechanisms into the distribution of subsidies for UAS projects.

1.4 Changing contexts and trends for universal access policy

Universal access and service (UAS) policies must fit contexts that have changed significantly over the past decade. In developing countries, these policies now have:

- **Much more ambitious goals.** Technology change and market growth have lowered costs to the level where near-universal access to telecommunications is an achievable goal for many countries, and a degree of use can be affordable for almost all citizens. Many countries have now set their sights on universal access (UA) for Internet and broadband services, as well as universal service (US) goals for telephony. [Chapter 8](#) discusses the implications of new technologies for UAS. ICT spending is now entering the budgets of base of the pyramid consumers [1]. Gapminder provides several interesting ways of visualising some of the tremendous changes, country by country, which have been taking place in technological usage [2].
- **More complex interactions with other policies.** ICTs are often interdependent and support many applications and services; these increasingly close relationships are often called convergence. UAS policies should ideally be designed in co-ordination with, or at least with consideration of, other government policies, including those for computer applications, health, education, government, and rural livelihoods (including electricity, infrastructure, etc.). Countries require overarching national ICT policies that address the sectors impacted by ICT. UAS policies are typically a sub-policy to the national ICT policy, which is outlining ICT development in all sectors of the economy and society. However, UAS policies aimed at increasing telecommunications infrastructure and access need not be held up if other sectors are slower; and
- **More experience and best practices to build on.** Over the past decade, many developing countries have introduced UAS policies. This toolkit aims to bring together the most important lessons from this experience.

These changed contexts are reflected in the observed and possible future trends in UAS policies described in [Sections 1.4.1](#) and [1.4.2](#).

END NOTES

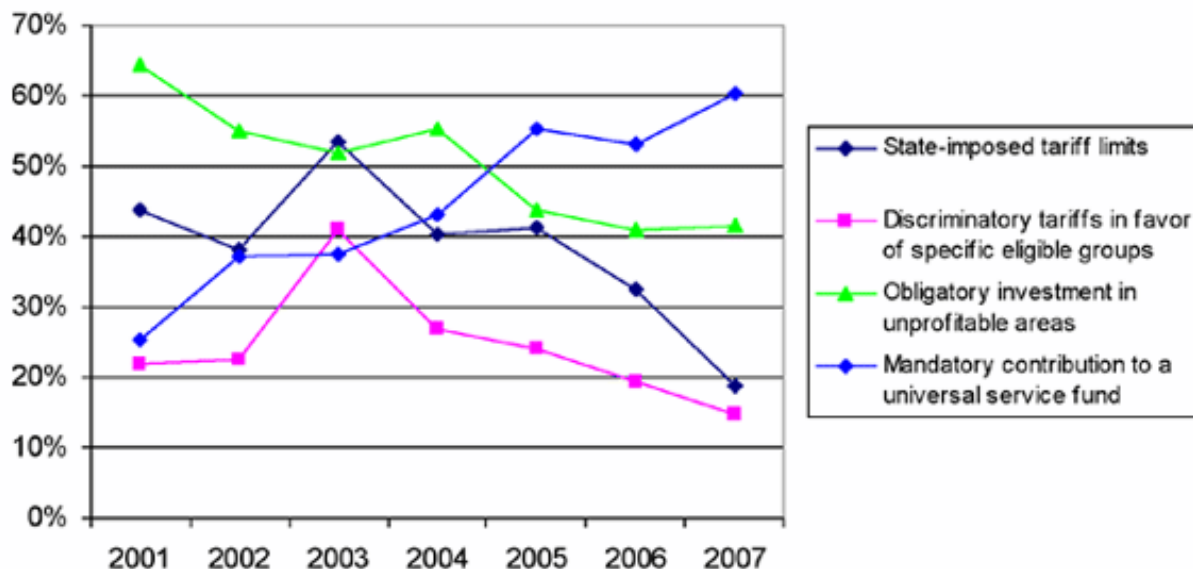
1. See [The Next 4 Billion: Market Size and Business Strategy at the Base of the Pyramid](#) (Allen Hammond and others, WRI, March 2007), especially Chapters 1 and 3.
2. See [Gapminder](#) (Gapminder Foundation). Look for specific relation between teledensity and income, click “play”.

1.4.1 Trends in universal access policy

The ITU World Regulatory Database (www.itu.int/ICTeye) helps in detecting trends in regulatory practice. The chart below summarizes data supplied on universal service (US) policies over the years 2001-2006. There are random fluctuations from year to year because of changes in the number and composition of survey respondents. Also, though the database refers to universal service, many of the policies relate to universal access, not to universal service. Still, the data support the following views:

- Universal Access and Service Funds (UASFs) are rising in popularity, and in 2007 are used in 60 per cent of countries that responded to the ITU survey;
- Obligatory investment in unprofitable areas has correspondingly been declining in popularity; and
- The use of state-imposed tariff controls, to benefit all customers or just to benefit specific eligible groups, declines steadily since 2003 and dipped below 20 per cent of respondent countries in 2007.

Figure: Responses to questions on universal service policy, 2001-2007



Source: ITU World Regulatory Database

Fuller analysis of the responses shows that USAFs have been established across countries of all income levels. Although many countries have established a fund, the number of entities that are already operational is smaller. Other trends that can be observed are [1]:

- **Using competitive processes when awarding UASF.** Competition increasingly determines the company that receives funding, and also the amount of funding to be awarded, however, sometimes the amount of funding is decided in advance and the company chosen on the merits of its proposed activities (e.g., the amount of coverage that it offers);
- **Greater diversity in the type and size of project that may receive UASF.** Though new network infrastructure (both passive and active) is still the biggest charge on the funds, other costs such as telecentres, training and content may also be funded;
- **Opening competition for funds to a wider range of entities.** Large infrastructure projects require large companies with financial and technical muscle, but smaller projects may be suitable for smaller companies and greenfield operators and for more local participation;
- **Specifying minimum requirements rather than specifying the technology,** so as to gain the advantages of the latest technical advances (technology-neutrality);
- **Greater awareness of the equal rights of people with disabilities and other disadvantaged groups,** and the benefits of design for all to make ICTs accessible for everyone at little extra cost; and
- **Using simplified methods of cost estimation when not using competitive processes.** Estimation is based on trends or negotiation instead of complex cost modelling.

END NOTES

1. See [Global Trends that will Impact Universal Access to Information Resources](#) edited by Christine Maxwell, Internet Society, July 2000). This is a now somewhat dated, but originally comprehensive and authoritative overview that is still of value for its breadth; most of its recommendations still hold.

1.4.2 The future evolution of universal access: e-inclusion

The notion of universal access (UA) to telephony has extended in two directions: towards UA to ICTs (and particularly to the Internet, with broadband Internet access becoming the new norm), and towards universal service (US), in which access is convenient and affordable, so that use becomes routine. The future of universal access and service (UAS) will probably consist of "e-inclusion", which is the goal of the European Union (EU) in *EU Ministerial Declaration on e-inclusion, Riga*. The Riga declaration recognizes the social consequences of lacking access to ICTs when ICTs have become engrained in all parts of the economy, public and personal life. It stresses actions in the following areas:

- Using ICT to address the needs of older workers and elderly people;
- Reducing geographical digital divides;
- Enhancing e-accessibility and ICT usability for people of all abilities;
- Improving digital literacy and competences;
- Using ICT to promote cultural diversity; and
- Promoting inclusive e-government.

Aspirations have become much broader and include large elements of human social development and constructive applications, as well as the spread of technology and infrastructure.

Developing countries have not yet reached the levels of dependence on ICTs that are current in the EU, but the following sentiments voiced in the Riga Declaration hold a broader relevance and illustrate the direction of change to be expected over the next decade:

- ICT contributes to improving the quality of everyday life and social participation of Europeans, facilitating access to information, media, content and services, to enhanced and more flexible job opportunities, and to fight against discrimination. Improving ICT access for people with disabilities and elderly is particularly important.
- E-inclusion means both inclusive ICT and the use of ICT to achieve wider inclusion objectives. It focuses on participation of all individuals and communities in all aspects of the information society. E-inclusion policy, therefore, aims at reducing gaps in ICT usage and promoting the use of ICT to overcome exclusion, and improve economic performance, employment opportunities, quality of life, social participation and cohesion.
- To convincingly address e-inclusion, the differences in Internet usage between current average use by the EU population and use by older people, people with disabilities, women, lower education groups, unemployed and less-developed regions should be reduced to a half, from 2005 to 2010.

1.5 International developments

The main international initiatives related to universal access and service (UAS) are the World Summit on the Information Society (WSIS) objectives, and the Millennium Development Goals (MDG).

The WSIS objectives (reviewed in [Section 1.5.1](#)) raised the political profile of ICT development and recognized that access to communications is necessary to achieve basic human rights. The WSIS objectives also recognize the need for special action (i.e., a UA policy and its implementation) to provide such access to all, especially disadvantaged groups. They also prompted commitments to provide a large amount of funding for connecting communities globally by 2015.

The Millennium Development Goals (MDGs), discussed in [Section 1.5.2](#), include a global partnership for development whose target is to provide citizens with all the benefits of new technologies, especially information and communications, in cooperation with the private sector. There is some debate around whether and how ICT deployment assists in reaching the MDGs, but the following points seem clear:

- ICTs can help in implementing many initiatives that contribute directly to reaching development goals even when they do not necessarily contribute directly themselves;
- ICTs have impacts that depend on the technical, economic, administrative and social environment, so general assessments of their contributions without considering the local context are difficult; and
- ICTs are increasingly understood to be complementary to other development imperatives and not to be traded off against them.

1.5.1 The World Summit on the Information Society objectives

The World Summit on the Information Society (WSIS, Geneva 2003 – Tunis 2005) brought together world leaders to address themes related to the information society, ICT development and the digital divide. The summit and its follow-up process have been the focus of many activities that are relevant to universal access and service (UAS), including the following:

- **Declarations of widespread support.** These declarations cover:
 - Recognition of access to communications as necessary to achieve basic human rights; and
 - The need for special action to help provide such access to many disadvantaged groups, including least developed countries, inhabitants of remote rural areas, and people with disabilities. The Practice Note *The WSIS principles and commitments, 2003 and 2005* reproduces some particularly relevant passages.
- **Funded projects.** The ITU “Connect the World” initiative, which aims for global connectivity for every community by 2015, lists 70 multi-stakeholder projects, each related to one or more of three building blocks of UAS – enabling environment, infrastructure and readiness, and ICT services and applications [\[1\]](#). Taken together, these projects reach practically every country in the world. They build on the 375 “Golden Book” commitments made by all types of stakeholders immediately after the Summit [\[2\]](#). These commitments, represented new funding, amounted to nearly USD 4 billion. The stocktaking database currently lists more than 3000 projects, over 1000 of which relate to ICT infrastructure building. Also, the World Bank is actively funding major connectivity initiatives, especially in Africa, notably the Eastern Africa Submarine Cable System (EASSy) and Africa Regional Communications Infrastructure Program (RCIP).

Of course some of this activity would have happened without the WSIS, but the WSIS raised the profile of information society building and attracted new finance. In particular, the WSIS Outcome Documents highlighted the importance of ICTs for helping to meet the Millennium Development Goals (MDGs), as discussed in [Section 1.5.2](#).

The term digital divide, which means grossly unequal and inequitable access to the benefits brought by modern ICTs, has been current for several years. WSIS tried to replace the somewhat negative objective of closing the digital divide with the more positive idea of pursuing digital opportunities for everyone. WSIS set in motion follow-up procedures and annual reports, which include assessing progress. An early assessment is given in the Practice Note *The prospects of achieving the WSIS targets, 2005*. A fuller discussion of many possible indicators is in *Partnership on Measuring ICT for Development: Core ICT Indicators*.

END NOTES

1. See [Connect the World](#) (ITU).
2. See [Golden Book: Stakeholder Commitments and Initiatives](#) (ITU).

1.5.2 The Millennium Development Goals

The eight Millennium Development Goals (MDGs) relate to different aspects of human development [1]. The eighth MDG articulates the need to “develop a global partnership for development,” and includes a specific target, “18: in cooperation with the private sector, make available the benefits of new technologies, especially information and communication,” with indicators drawn from *Partnership on Measuring ICT for Development: Core ICT Indicators* (measuring telephone lines, cellular subscribers, personal computers in use and Internet users per 100 inhabitants).

The extent to which ICTs should be deployed in support of other MDGs has been controversial as it was questioned whether money spent on ICT was taking away resources for more urgent needs such as clean water, health and education etc. [2]. But, the debate in the 1990s of choosing between ICTs and other development imperatives has now shifted from one of tradeoffs to one of complements [3]. With each year that passes, as ICTs improve and people become better equipped to make the most of them, this shift towards seeing ICT as complementary is likely to increase. In fact, ICT deployment could support each of the MDGs, as is shown in the Practice Note *Examples of the role of ICTs in supporting the MDGs in Asia*.

Development specialists stress that for ICT to make a positive contribution to poverty alleviation, the following are essential considerations:

- A well thought out development strategy should come first;
- Information and communications needs for implementing the strategy should be identified; and
- ICT should be deployed appropriately to meet these needs.

Telephone service almost always has clear benefits for the poor, while Internet and advanced services need to be deployed as a tool for specific development goals. Many case studies are provided in *Information and communication technologies for poverty alleviation*.

In the past, there were too many examples of the ICT arriving first, with the tail wagging the dog or a solution looking for a problem. To avoid this, the development-strategy-led approach now points to the inclusion of ICT goals in Poverty Reduction Strategy Papers, in order to ensure the availability of ICT as and when needed for poverty reduction [4]. This has been done in Rwanda, for example [5].

The reference document *Good practice paper on ICTs for economic growth and poverty reduction* points out that ICTs can support progress towards the MDGs through the following main routes:

- Empowerment and the Poverty Reduction Strategy Paper process;
- Efficiencies in service delivery; and
- Livelihood enhancement.

END NOTES

1. See *Tracking the MDGs: Targets & Indicators* (UNDP), http://www.undp.org/mdg/tracking_targetlist.shtml.
2. See *ICTs and the MDGs: A Quest for Empirical Regularities and Indexing, Section VII of Promoting ICT for Human Development in Asia: Realising the Millennium Development Goals: Summary* (UNDP, 2004), <http://www.apdip.net/projects/rhdr/resources/summary08012004.pdf>.
3. See *Creating a Development Dynamic: Final Report of the Digital Opportunity Initiative* (Digital Opportunity Initiative, July 2001), <http://www.opt-init.org/framework/DOIReportwithoutcover.pdf>, and *ICT and MDGs: A World Bank Group Perspective* (World Bank, December 2003), http://www-wds.worldbank.org/external/default/WDSContentServer/IW3P/IB/2004/09/15/000090341_20040915091312/Rendered/PDF/278770ICT010mdgs0C.
4. See Charles Kenny, Juan Navas-Sabater, Christine Qiang, Chapter 24 Information and Communication Technologies, in the Poverty Reduction Strategy Paper (PRSP) Sourcebook <http://go.worldbank.org/LG6WMS3800>.
5. See *The Government of Rwanda Poverty Reduction Strategy Paper* (MFEP, June 2002), <http://www.undp.org.rw/prsp2002.pdf>.

1.6 Integration with other national programmes

Universal access and service (UAS) policies do not exist in isolation, they are relevant to education, e-government, electricity, and micro-finance and e-banking, among others. However, overarching national policy on ICT development should provide overall direction and facilitate and define the inter-linkages among the various sectors, policies, stakeholders and initiatives.

ICTs are especially important for education, but voice alone is a limited medium, telephony and radio broadcasting are not enough in the context of dynamic education. In consequence, universal access (UA) generally means “universal Internet access”, and increasingly, “universal broadband Internet access”. Many UAS policies include the provision of Internet access to schools, often partially paid for by Universal Access and Service Funds (UASFs). However, while Internet access for schools might be paid for by UASFs, making effective use of the access is the responsibility of the school, the ministry of education and others. The task of training teachers and providing enough useful and appealing content is particularly significant. The relation between UAS and educational development programmes is considered in further detail in [Section 1.6.1](#).

E-government is the use of ICTs to make government more responsive, efficient, effective, and transparent. The conditions within a country, including communications infrastructure and public access, transparency of governance, but also government capacity and public literacy, affect what is worth attempting in e-government. These conditions are considered in [Section 1.6.2](#).

Though electricity is essential for telecommunications, in some developing countries telecommunications are often more widespread or more reliable than the main electricity supply; network operators provide their own power generators and their customers find unorthodox ways of recharging equipment, e.g., through car batteries. Important benefits could be gained by co-ordinating the provision of telecommunications with the provision of the main electricity supply. As discussed in [Section 1.6.3](#), telecommunications networks would be easier to operate and use and could share physical infrastructure with electricity networks. While it is a highly desirable practice, this co-ordination might be difficult to achieve. However, this absence does not need to prevent telecommunications provision in places that do not yet have the main electricity supply.

Financial services that deal with small sums of money (micro-finance) are widely believed to help people escape from poverty, for example, the Grameen Village Phone programme, provided women with loans to buy phones, sell phone calls, make profits and repay the loans. E-banking uses ICTs to make micro-finance available to more people in new, less expensive ways. As discussed in [Section 1.6.4](#), these initiatives raise regulatory challenges of their own, separate from those of telecommunications; customers must be protected against fraud but regulation must not prevent the development of valuable and trustworthy services.

1.6.1 Education

Education is a major part of all human development programmes. Achieving universal primary education is the second of the eight MDGs. The following four of the ten WSIS targets (for 2015) also relate to education:

- **Target 2.** Connect all universities and colleges, secondary and primary schools;
- **Target 3.** Connect all scientific and research institutions;
- **Target 4.** Connect all public libraries, archives, museums, cultural centres and post offices; and
- **Target 7.** Adapt all primary and secondary school curricula to meet the challenges of the information society, taking into account national circumstances.

Education is a favoured area for funding and deploying modern ICTs [\[1\]](#). The reasons for this include the following:

- ICTs record and distribute knowledge that people need to learn in a timely manner. Modern ICTs can maintain more up-to-date and accessible information than books, link teachers and pupils with their peers elsewhere (as in Singapore, where every classroom is connected to the Internet);
- ICTs provide interactive learning experiences which complement face-to-face teaching, and can remedy teacher shortages (e.g., by transmitting lessons to small remote groups of children or by enabling scarce specialist expertise to be shared);
- For an ever-larger number of people, ICT skills are essential to future employability;
- Children and young people everywhere take readily to new technologies. Long-term national ICT strategies naturally focus on equipping today's young people for the future; and
- As educated people and respected community members, teachers are often the first to perceive the benefits of improved ICTs in their community and are instrumental in bringing them about.

As stated earlier, for education, voice alone is a limited medium, and universal access (UA) generally means universal Internet access, and increasingly, universal broadband access. Content to be accessed is a prime concern. When suitable educational content has been obtained, making it available on a non-networked basis (e.g., on CD-ROM) may be beneficial, as it can be used by more people and without occupancy of scarce or unreliable bandwidth; the Practice Note The eGranary digital library gives an example of this scenario.

The widely publicized One Laptop Per Child initiative is an example of an ICT-for-education project focusing on terminals (with appropriate content) rather than on networks. ICT-for-education projects do not always require telecommunications networks end-to-end.

Telecommunications networks, with video, could be used in remote teaching, teacher support and teacher training to help to overcome the

shortage of teachers in rural and remote areas. However, the cost of implementation has to be compared with other ways to overcome the shortage, such as paying higher salaries.

In several countries, universal access and service (UAS) and educational development programmes are linked to some extent. Two examples of these programmes are:

- In South Africa, connectivity and computers for school computer labs continue to be provided under the community service obligations of network operators; and
- In Uganda, a separate component of funding from the Rural Communications Development Fund (RCDF) is used for connecting secondary schools in rural areas.

It is useful for UAS policymakers and educators to communicate and cooperate in regards to educational development programmes. However, Universal Access and Service funds (UASFs) should focus mostly on connectivity and possibly hardware, while the ministry of education and schools need to ensure the effective use of that access through providing computers, content, training and support.

Universities find Internet access particularly valuable because staff and students can build networks of contacts that bring about enhanced knowledge development and transfer. Universities have been leaders in the introduction of Internet access into education.

END NOTES

1. For an extensive collection of resources about ICTs in education, see [Using ICTs to help meet the Millennium Development Goals](#) (InfoDev). For the entire separate ICT-in-Education Toolkit for Policy Makers, Planners and Practitioners (InfoDev, April 2007), see <http://www.infodev.org/en/Publication.302.html>, which has its own list of reference documents.

1.6.2 E-government

The term e-government (and its close relation e-governance) gets used in many different ways [1]. Broadly speaking, e-government is the use of ICT (or more narrowly, the Internet) to make government more efficient, responsive, effective, and transparent. In this context, government can mean any activity by officials at a national, regional, or local level, and can encompass whole development programmes, such as improving health or education, as well as day-to-day administrative activities [2]. *Governance and the Internet* underlines how conditions within a country affect what it is possible or sensible to attempt in e-governance, with illustrations from Asia.

The most popular use of the term e-government in developing countries may be applying ICTs to make administrative transactions, such as getting certificates or permits, or registering a birth or death, more accessible to citizens and less prone to corruption: citizens make fewer journeys, complete fewer forms and meet fewer officials. This approach has been pioneered in India, to modernise procedures suited to a different era and way of life [3].

Successful e-government projects [5] sometimes get more publicity than unsuccessful ones, but it is important when developing UAS policy to take lessons from both [6].

The reach of e-government depends on the availability of infrastructure, and in some cases e-government projects provide or contribute to this availability. However, e-government has many other requirements besides the availability of infrastructure; they may jointly be called e-readiness. To ensure that e-government applications are matched to the readiness to accept and use them, they should often be introduced in stages. The Practice Note *A staged approach to developing e-government* shows stages suitable for the least developed countries.

END NOTES

1. For an [eGovernment Toolkit](#) (InfoDev).
2. For a virtual library on e-government, see [Knowledge Systems and E-government](#) (UNPAN).
3. For information on, and evaluations of, such projects, see [e-Governance & e-Government](#) (UNDP Asia-Pacific Development Information Programme).
4. See *e-government for development* (University of Manchester) <http://www.egov4dev.org/>.
5. For examples see <http://unpan1.un.org/intradoc/groups/public/documents/un/unpan028454.pdf>
6. For case studies classified by degree of success, as well as by sector and region, and help in understanding the factors underlying success, see [Cases of eGovernment Success and Failure from Developing/Transitional Countries: Categorised](#) (University of Manchester).

1.6.3 Electricity

Electricity is extremely relevant to Internet and broadband development, as end-user terminals such as computers require much more power than mobile phones. While telephone networks and use has not been stopped by the lack of public power infrastructure (though the

lack has increased cost and slowed speed of network development), further Internet and broadband development and geographical spread will depend highly on increasing national electrification as a pre-condition.

The Energy Challenge for Achieving the Millennium Development Goals does not expect universal access (UA) to electricity before 2030 (and possibly much later in rural areas of some least developed countries,) yet it stresses that electricity makes a huge contribution to achieving the MDGs. Without electricity to power hospitals and schools, health and education objectives become difficult to achieve. Households quickly acquire simple electrical appliances as a high priority once an electricity supply is available; electric lights or fans enhance personal comfort and productivity, televisions entertain and inform. It is hard to imagine a comfortable lifestyle in the modern world without electricity.

There are several important links between electricity supply and telecommunications:

- Most obviously, the lack of electricity supply raises telecommunications network costs significantly, so funding universal access and service (UAS) in areas without electricity supply represents an additional burden on the budget;
- There is often potential for shared backbone infrastructure. Power poles and ducts can carry optical fibre alongside the power cables at low marginal cost, indeed, recently installed power systems are very likely to include optical fibre for the use of the power company;
- There is sometimes potential for shared access infrastructure. Local telecommunications distribution can occasionally use Power Line Communications (PLC), in which the power cables themselves carry telecommunications. However, the technology has to date been used too little to become sufficiently general and inexpensive; and
- Community capacities developed by local participation in distributed electricity generation (such as solar or micro-hydro schemes) could also lead to community demand for, and provision of, communications facilities.

As people generally give higher priority to electricity supply than to telecommunications, one might logically expect that electricity supply would arrive in a community first. When this happens, telecommunications follow more easily, however, often the reverse is true. Network operators install base stations complete with their own primary generators (not just the standard backup generators), and people show great ingenuity in keeping their mobile phones charged (e.g., by using car batteries or taking phones in batches to nearby towns for recharging).

Ideally, piecemeal ways of supplying power to terminals and network equipment would not be needed. Telecommunications and Internet could be provided in co-ordination with electricity generation and transmission, and the power requirements of telecommunications would benefit from efficiencies of scale. Such schemes would not need to cover the country; more local schemes, in which the points of consumption are close to the points of generation, might well have more acceptable environmental and other effects, and give both users and producers greater feelings of responsibility.

Whether telecommunications provision and electricity generation and transmission can be coordinated in this way depends upon local circumstances. As a policy objective, coordination is desirable, however, communities may not accept delay in telecommunications provision just because they do not yet have the main electricity supply.

1.6.4 Micro-finance and e-banking

This section looks at micro-finance, a leading application of ICTs, which can be provided through e-banking or m-banking.

Multi-stakeholder partnerships, including the public sector, the private sector and often non-governmental organizations (NGOs), are important for most development applications that exploit communications networks. However, the balance of public and private sector participation in the application programmes varies. Education and health applications are usually government-led, with strong NGO participation and some private sector partners. Other applications may be led by the private sector, with government and NGOs in support. Micro-finance is a good example of this type of application.

There is a widespread perception that appropriate financial services, including credit, savings, cash transfer and insurance, can help people work their way out of poverty. This is reflected in the “Nextbillion” initiative, which focuses on “development through enterprise” and provides a large database of activities that combine both business and development benefits [1]. The benefits often result from selling to poor people or production by poor people. Of the 16 Nextbillion activity classifications, six relate to financial services (and a further three to ICTs). The 2006 Nobel Peace Prize, awarded to Mohammad Yunus and Grameen Bank for pioneering achievements with micro-finance (and specifically with micro-credit for supporting small businesses), has raised the profile of this aspect of development.

The Grameen Village Phone programme was an early application of the Grameen Bank micro-credit services in Bangladesh. Suitably qualified women received loans to buy Grameen Phones so they could sell phone calls to their fellow villagers and generate income from which they paid back the loans. Similar village phone schemes have followed in many other countries. It is a tribute to the extensive growth of the mobile market and the village phone programme itself that in Bangladesh the village phone programme may no longer be very profitable in areas where the market has matured and shared as well as individual access is now widespread [2].

Of course, financial services designed for poor people pre-date telecommunications access in rural areas. However, these projects can grow significantly along with wider telecommunications access. The synergies of telecommunications networks and financial services can

be regarded as a form of convergence.

New ICTs make it possible to provide financial services in new, cheaper ways, and to more people. Several projects in developing countries are exploring how e-banking using ICTs can spread access to financial services. The Practice Note *Examples of financial services using mobile phones* explains some of the main models for m-banking and describes several specific examples in different countries.

The intensive development work on e-banking holds great promise for the future [3], however, financial services often inspire mistrust, sometimes with good reason (e.g., excessive interest rates on loans). E-banking raises challenges for regulation separate from those of telecommunications services. For instance, funds must be supervised to provide prudent protection from loss, but regulation must not be so great a burden on service providers that transaction prices would rise out of reach of the target customers. A similar situation has been resolved in some countries of the EU where mobile phone operators are not regulated as banks if only small funds are generated by prepaid cards and needed for customer transactions [4].

Ways in which telecommunications policymakers and regulators could integrate universal access and service (UAS) and micro-finance initiatives are as follows:

- Stay informed about rural financial service expansion;
- Keep abreast of emerging value-added services with a financial component offered by telecommunications operators or over telecommunications networks;
- Ensure that the responsibilities for regulating value-added services with a financial component are laid down clearly and understood widely. Financial regulators, not telecommunications regulators, might have the main responsibilities, but users will not be interested in the demarcation: they will expect to be protected adequately and are likely to see problems as defects in telecommunications services;
- Take part in any national working groups on expanding financial services or e-commerce for poor people. Cyber-security, and user identity management, are prerequisites for the development of e-commerce; and
- When formulating UAS programmes, aim where possible to support target areas and activities for financial services expansion.

END NOTES

1. See [Development through Enterprise](#) (WRI). This provides research reports, many case studies, and activity descriptions on micro-finance and several other topics.
2. See [Unplanned Obsolescence](#) (Richard Shaffer, Fast Company, September 2007), with the accompanying comments by others.
3. For two other sources of information and tools, see:
 - [Consultative Group to Assist the Poor](#) (CGAP). This is dedicated to “building financial systems for the poor”; it aims to support ideas about products, technologies, mechanisms for delivering financial services, and challenges of expanding micro-finance; it provides *Microfinance Gateway* for this purpose.
 - [Sending Money Home](#). This is a tool to help people in several countries to find the best way to send money to other countries; it also provides to the *Migrant Remittances* newsletter.
4. For discussions of the problems with e-money on mobile phones, see [E-money](#) (EU).

2 Regulatory Reform & Universal Access and Service

Universal access and service (UAS) is achieved through a combination of sector reform, dedicated financing instruments and additional measures that stimulate market expansion into rural and remote areas. This chapter explores the role of sector reform in achieving UAS.

Regulatory reform is integral to UAS policy. It is important to emphasize that regulatory reform is part of UAS policy and not separate. There is a misconception that privatization and liberalization does not promote UAS and benefits only investors, industry players and urban and business customers, thereby creating a need for a UAS policy that will ensure that all are served. It is more accurate to consider regulatory reform as the first step in achieving UAS, and that a UAS policy is an additional measure to complete and supervise what a well-regulated and efficient market begins.

[Section 2.1](#) emphasizes the advisability of implementing regulatory reform before implementing any specific measures such as Universal Access and Services Funds (UASF). The section also describes the main regulatory reform topics such as authorizations/licensing, interconnection, competition and price regulation, that need to be addressed, and their impact on UA.

The most important step of sector reform is introducing competition, which coupled with fair and independent regulation, creates a level-playing field between operators. This is especially important if the incumbent operator is not yet privatized. The positive impact of effective competition has been demonstrated in most countries' mobile services. [Section 2.2](#) discusses how competition affects and improves UAS. Also, operators can and do view UAS provision as a business opportunity. How they address the UAS market is described in [Section 2.3](#).

[Section 2.4](#) outlines specific regulatory measures that can be used in addition to general reform and best practice regulation to improve UAS. [Section 2.5](#) is dedicated to discussing measures and options to create an enabling broadband environment. If put into practice, then the regulatory reform measures discussed, create more sustainable and widespread communications access as well as service growth.

2.1 Reform first

A thorough liberalization process, whereby the communications sector is effectively regulated and open to fair competition from private investors, is vital to the success of a universal access and service (UAS) programme for the following reasons:

- Without an effective regulator operating within a modern communication law, there are significant challenges for the implementation of a UAS programme;
- Where a government continues to be a market player, usually by owning all or a part of the incumbent operator, it is likely that the government cannot be impartial when making sector policy and UAS policy, as it will have a vested interest in one of the market participants. Also, there is a risk that governments will continue to direct the incumbent operator to serve certain areas for political reasons, regardless of viability; and;
- Only a reformed or renewed institutional framework is conducive to network and service expansion on an equitable basis. Therefore, competition, interconnection, licensing/authorization policies, tax burdens and any economic disincentives must be properly addressed.

Liberalization, through private sector participation and open competition, encourages UAS by setting targets or providing opportunities that motivate operators, such as the following:

- Setting license or contractual obligations for the roll-out of services that are explicit and realistic;
- Exceeding roll-out obligations for reasons of longer-term profit;
- Ensuring the ability to run efficient and politically un-encumbered communications businesses;
- Creating fiscal benefits for introducing investment capital and expertise; and
- Facing less political interference (decisions based on non-commercial issues) than incumbents have traditionally faced.
- Being demand-driven increases the chances of both responding to consumers' needs and closing the market efficiency gap.

Thus, governments should implement regulatory reform measures before creating Universal Access and Service Funds (UASFs) or other specialized subsidy tools. Such regulatory reform efforts should include:

- The development of a modern regulatory framework, including addressing the impact of convergence, and the establishment of an

independent and effective regulator. The national regulatory authority (NRA) should have the qualities of an accountable entity with decision-making powers that are isolated from vested interests. Consideration needs to be given to the scope of the regulatory authority's role and responsibility, introduction of a statutory framework that enables effective operation within government hierarchy and ability to set and enforce measures that are publicly acceptable. For a discussion of this, see [Module 1: Regulating the Telecommunications Sector: Overview](#), and [Module 6: Legal and Institutional Framework](#);

- The effective regulation of competition and the establishment of interconnection and tariff rules is examined in [Module 2: Competition and Price Regulation](#);
- The pursuit of technologically neutral licensing, unified licensing or general authorizations is discussed in [Module 3: Authorization of Telecommunications Services](#); and
- The management of radio spectrum, maximizing the use of this scarce resource, and allowing for innovative and emerging technologies, including Broadband Wireless Access (BWA) is explored in [Module 5: Radio Spectrum Management](#).

[Sections 2.1.1](#) to [2.1.3](#) tackle some of the main regulatory reform issues. These issues include:

- New licensing approaches that allow operators to have the freedom to choose technologies to be used and services they wish to provide; and
- Competition regulation, especially regarding open access and the importance of interconnection and tariffs.

These sections discuss specific cases that illustrate potential problems with UAS programmes if certain reforms or regulatory requirements are not addressed.

[Section 2.1.4](#) review radio spectrum management and regulation, while [Section 2.1.5](#) addresses other economic incentives that can be used to improve UAS before any special UASF or other intervention is used: taxes, import duties and other (regulatory) fees.

[Section 2.1.6](#) discusses the importance of the removal of pre-liberalization Universal Service Obligations (USOs), often borne by the fixed incumbent operator.

The discussion about regulatory reform concludes with [Section 2.1.7](#) providing some considerations about the timing of a UAS programme in relation to regulatory reform.

2.1.1 Technology neutral, unified licensing or general authorizations

In regards to universal access and service (UAS), having operators in the marketplace that are restricted to fixed service provision only (usually, the incumbent operator) can be a considerable obstacle for the implementation of a UAS programme. Fixed incumbents are disadvantaged and, often resistant to the introduction of a modern UAS programme. Wireless technologies are more cost-efficient in reaching rural areas than fixed services, including broadband wireless access (BWA). Even if a UAS tender for a subsidy (see [Section 7](#)) is designed technology neutral, wireless operators have a significant technological advantage.

At the beginning of sector reform, with the introduction of new entrants and competition for the incumbent, creating a level playing field meant limiting the power of the incumbent, especially in regard to interconnection and access to the incumbent's long-distance transmission network. However, with the success of wireless and mobile technology, the position of many fixed network operators in developing countries is actually weaker, especially in reaching rural areas. Thus, in regard to a UAS programme, creating a level playing field now often means ensuring that incumbents can compete by introducing technology neutral or unified licences, or general authorizations, especially when they have been incorporated as commercial companies or privatized, and no longer receive favouritism and financing from the government.

In a competitive UAS mechanism to allocate funding requires all operators to have a fair chance of participating. For example, in Uganda there were three players (MTN, UTL and Celtel) during the universal access (UA) competitive subsidy tenders and they were all able to participate. MTN had a technology neutral licence, UTL was the former fixed incumbent and was not only privatized, but also had a mobile licence, and Celtel was a mobile operator. They all had the same opportunity to use the most cost-efficient technology that contributed to the industry's acceptance of Uganda's rural communications development policy and UA programme and its success to date. Also, there were three regions for which a subsidy was on offer; operators were allowed to bid for all three regions or pick and choose any of the three. The winning bidder was the operator who offered the lowest request for subsidy in each of the three UA areas.

In Botswana, further liberalization is being implemented in time for the new Universal Access and Service Policy. In response to a government study on further liberalization of the sector [\[1\]](#), key further liberalization steps were taken in 2006. These included major moves to achieve service neutral licensing of the three major operators and to allow further competition in the market. Service-neutral means that the licence does not restrict the services that can be provided under this licence, also smoothing the pace for broadband development. The steps include:

- The two mobile operators are permitted to provide their own long distance transmission systems without the current condition of having to request services first from the fixed incumbent operator BTC;
- Current fixed line and mobile operators are able to apply for service-neutral licenses; this, in effect, means that BTC is allowed to operate a mobile network and to utilize mobile technology as it deems appropriate;

- International voice gateway services is liberalized, ending BTC's monopoly; and
- In December 2009, potential new entrants will be invited to apply for a public telecommunications license, under the service-neutral licensing regime.

These steps ensure that the main operators who are asked to contribute to a UASF will compete on a level playing field for future UAS subsidies and projects, and share the burden and opportunity of UAS more equally.

Where UAS policies are being implemented without fixed incumbent operators or other major operators having a chance to participate, opposition and un-co-operative behaviour is to be expected. For example, incumbents have been asked to contribute to a UASF, without being able to bid. Fairness and a level playing field require that a technology neutral or unified licensing regime is implemented before or in parallel with the implementation of a UAS programme.

End notes

1. *Recommendations on Further Liberalisation of the Telecommunications Industry of Botswana*, February 2005, by Ovum

RELATED MATERIALS

Module 3, "Authorization of Telecommunication/ICT Services", section 2, ["General Authorizations and Open Entry Policies"](#)

Module 3, "Authorization of Telecommunication/ICT Services", section 8.3, ["Unified and Multi-service Licensing"](#)

2.1.2 Open access and regulating dominant markets

Access to competitively priced national and international long-distance transmission is crucial for the success of a universal access and service (UAS) programme, both for the telephony part as well as the Internet or broadband part.

In a more general way, any dominance over transmission or international gateways usually keeps bandwidth and leased line prices higher than in a competitive environment and affects affordability for the end-user. It also limits the investment capacity of the other operators and service providers, which pay high prices for transmission or bandwidth rather than investing in network expansion.

More specifically, being able to participate in a particular UAS competitive bid depends, at least partially, on the existing backbone footprint of each operator - especially in very large and geographically challenging countries. If the backbone networks of the main operators are vastly unequal, so too will be their participation in a UAS subsidy bid assuming no regulation is in place allowing open access at fair prices. This is even more so the case with Internet Service Providers (ISPs) and Mobile Virtual Network Operators (MVNOs), which are often not facilities-based and depend on receiving fair access to and pricing of transmission networks.

Mozambique launched a universal access (UA) pilot project in 2007, in the northern provinces of Zambezia and Nampula, which was initially unsuccessful. An investigation of the bid unveiled a combination of inhibitive factors; prominent among those was the challenge of the backbone. The fixed incumbent operator has the largest fibre-optic network in the country, however, its backbone prices are considered by most of the industry to be too high, prompting other players to build their own networks or to use satellite transmission. As a consequence, the high long-distance transmission cost to provide UA service in the far-north deterred most potential bidders, especially ISPs that were interested in the separate Internet component.

Uncovering such challenges is precisely why a pilot project is recommended. Mozambique has now put itself in a position to move forward on a UAS programme with greater knowledge of inhibitive factors.

As discussed in more detail in [section 3](#), there are several reasons why open access is important and there are several ways of achieving it. As can be seen from the example above, open access must be addressed before UAS projects are implemented.

RELATED MATERIALS

Module 2, ["Competition and Price Regulation"](#)

2.1.3 Interconnection and tariffs

Interconnection agreements are a crucial regulatory factor for the commercial viability of rural telecommunications, because rural operations typically have more incoming calls. Interconnection agreements are particularly necessary vis-à-vis the payment for terminating access. For interconnection and tariffs see also the ICT Regulation Toolkit [Module 2 - Competition and Price Regulation](#), and [Section 2.4.6](#) in this Module for asymmetric interconnection.

A study in 2003 [\[1\]](#) that analyzed the success of Peru's Fund for Investment in Telecommunications (FITEL), the country's programme to

address rural telecommunications development and universal access (UA), found that almost 60 per cent of the traffic on the FTEL phones was incoming. This is typical for rural networks, where the more affluent urban relatives or friends make calls into rural areas. However, the interconnection rates and procedures for the licensed rural operators were the same ones applicable to the remaining non-rural operators and did not reflect their considerably higher network, operation and maintenance costs, especially since they used VSAT technology.

The effective interconnection charge (a combination of a termination charge plus local and long-distance transport) received by rural operators was USD 8.5 cents. As a comparison, in Chile, where the interconnection charge had been established through cost-based studies, the interconnection rate for a rural operator was USD 18.7 cents. This strongly affected the viability of the two Peruvian rural operators. While outgoing traffic accounted for less than half of all traffic, it provided over 80 per cent of revenue. Incoming traffic accounted for more than half of all traffic, but for only 15-20 per cent of revenue.

The problem was compounded through very low regulated retail tariffs, equivalent at the time to USD 5 cents for a local call. A local call was defined as a call within a department, an administrative unit of Peru. There are 24 departments within Peru, all of which are geographically quite large, so a local call might in fact be between two destinations over 200 km apart. Financial analysis at the time of rural company, GTH, with three years of operating history, reflected a loss-making enterprise even with subsidies included. Once aware of the issue, the regulator OSIPTEL took action and changed tariff and interconnection regulation for the rural operators.

End notes

1. Final Report submitted to the Public-Private Infrastructure Advisory Facility managed by the World Bank, the Ministry of Transport and Communications of Peru and to Organismo Supervisor de la Inversión Privada en Telecomunicaciones (OSIPTEL), entitled *Peru Detailed Rural Telecommunications Strategy - Private sector provision of telecommunications services in rural and peri-urban areas of Peru*, 30 June 2004, prepared by Intelcon Research & Consultancy Ltd., Canada.

RELATION MATERIALS

Module 2, "Competition and Price Regulation", section 3, ["Regulating for Interconnection"](#)

2.1.4 Radio spectrum regulation

[Module 5](#) of the ICT Regulation Toolkit, [Radio Spectrum Management](#), describes the fundamental objectives, principles, and processes of spectrum policy and management. There are three basic approaches to the allocation of frequencies, namely administrative, market and commons. The balance between them is now open to change due to the pressures of wireless innovation, as well as the need and also the opportunity for meeting the needs of rural areas and other targets of universal access and service (UAS).

- [Administrative approach](#) — assignment of frequencies by licensing to specific users for specific purposes, in a prescriptive fashion dictating the details of spectrum use, permissible equipment types, emission powers, etc;
- [Market approach](#) — recognizing that the conditions dictating the licensed ownership and use of the spectrum can change, even in the course of a licensee's operation. The approach creates markets for spectrum including trading of spectrum and even change of use with market demands; and
- [Commons approach](#) — covering the unlicensed use of frequencies, usually for short range, within certain technical limits. This includes applications such as Bluetooth, wireless identification and telemetry, and frequencies such as 2.4 GHz and 5.8 GHz used by Wi-Fi and sometimes WiMAX equipment to provide wireless LANs (WLAN) and MANs (Metropolitan Area Networks).

Broadband innovation and the need to enable service providers to meet UAS targets economically are both strong drivers for regulators to consider creative change [\[1\]](#).

In the current environment, effective spectrum management for the broadband era should follow the 2005 ITU Global Symposium for Regulators Guidelines, which are the following:

- Facilitate deployment of innovative broadband technologies - including the principle of minimum regulation and allocation of frequencies in such a way that facilitates new entry into the market;
- Promote transparency - including consultation and publishing of market forecasts, plans and registers of industry interest;
- Embrace technology neutrality;
- Adopt flexible use measures - including minimizing barriers to entry and adopting lighter regulatory approaches in rural and less densely populated area;
- Ensure affordability - reasonable spectrum fees that encourage innovation;
- Optimize spectrum availability on a timely basis;
- Manage spectrum efficiently;
- Ensure a level playing field - especially to prevent spectrum hoarding by incumbent operators;
- Harmonize international and regional practices and standards; and

- Adopt a broad approach to promote broadband access - including special measures for UAS.

Several international gatherings have focused on trying to promote Broadband Wireless Access (BWA) globally – and with some success. For instance, the WRC-07 event held by the ITU saw progress on the allocation of certain common frequency bands. Key issues remaining include choosing the bands, dealing with regional variations, and sharing the bands in an era of convergence.

In the context of UAS, it is possible that strategies should vary geographically within the country to allow for vastly different conditions from region to region or from urban to rural areas. Choices can be based on such things as spectrum scarcity in various parts of the country and in various portions of the spectrum and population density across the country. Consideration should be given to the various possibilities for both basic mobile telephony and BWA that may exist for:

1. Reclaiming or splitting national spectrum allocations for rural areas only, to enable more operators to share spectrum than might be possible in urban areas.

Especially in hilly, mountainous or low population regions, some GSM or CDMA mobile allocations are not fully utilized, even though they might be needed in urban zones. Operators often resist change, but regulators can look creatively at the need and resources available for enabling new market entry into the technologies that are proving to be economic, and efficiency of spectrum use. This has been successfully done in Brazil, where the regulator Anatel obligated major cellular players to split their spectrum and a new entrant, Ruralfone, entered the rural market;

2. Reducing or eliminating spectrum licensing fees for competitive operators in rural areas or those providing UASF tendered services;

This would encourage the entry of small operators and would also mean that UASF competitions become efficient one-stop shops for license, subsidy contracts and the required spectrum under certain conditions. One of the reasons for the success of the initial Chilean UASF competitions, which resulted in very low required subsidies, was that spectrum was offered in the tender package [2];

3. Reducing the technical constraints in the commons approach, such as allowing the power radiation limits to rise in rural areas where interference is not a major problem.

The Peruvian regulator, OSIPTEL, allows high powered use of the 2.4 GHz band for wide area Wi-Fi in rural areas [3];

4. Allowing frequencies normally limited to access networks (e.g., in the 2.4 and 5.8 GHz bands) to be used also for backhaul;
5. Allowing spectrum trading where underused frequency allocations are freed for use by other operators; and
6. Encouraging national roaming that helps drive up the overall use of communications and the ease of use between regions.

The Practice Note *Ireland's regulation of broadband wireless access* provides an example of the principle of barrier reduction and a creative approach to options 3) and 4) to encourage both BWA development and encouragement of small operators meeting potentially high cost challenges in rural areas.

Further discussion of spectrum issues specifically related to rural and UAS applications is provided in [Section 2.4.4](#).

END NOTES

1. A table in Section 1.5 of ICT Regulation Toolkit Module 5 indicates the changing balance proposed by Ofcom for spectrum allocation methods, which would see the administrative approach reduce from 96 per cent in year 2000 to 22 per cent market in 2010, the market approach move from 0 per cent to 71 per cent over the same period, and the commons approach to move from 4 to 7 per cent.
2. Closing the gap in access to rural communications: Chile 1995-2002, World Bank Discussion Paper 430, Bjorn Wellenius
3. The rural Wi-Fi network described in Practice Note *The rural wireless broadband network in Chancay-Huaral Valley District in Peru* is one example of the permitted use of high radiated power in the 2.4 GHz band

2.1.5 Taxes, import duties and other fees

Countries need to carefully review their ICT-related tax and fees regime before considering a Universal Access and Service Fund (UASF) or any other special government intervention. A UASF collects money, often from the industry itself through a small percentage of gross revenue, and then re-distributes it to operators willing and qualified to provide universal access and service (UAS) in certain areas for the least amount of subsidy (for more details on UASFs see [Section 3.2](#)).

High taxes, including corporate tax, import tax, and tax on services and handsets, result in fewer people gaining access to telephony services and slower network roll-out. Some countries with higher taxations of mobile services and handsets have low subscriber penetration [1]. In general, lower taxes, especially import duties, do lower the cost of network equipment, resulting in more network build-out. Lower taxes on end-users equipment, including computers, make them more affordable to customers; thus lower service taxes impact demand elasticity and can increase usage.

Countries can review and benchmark their tax regimes, especially with those countries that can be categorized as comparable (e.g., in

regards to their economy), but have higher network coverage and subscriber penetration. It is also worthwhile to analyze whether a tax reduction could be revenue neutral as the tax base increases (e.g., when more people buy handsets or use services). It might also be possible that lower import duties result in more revenue, or the same amount of revenue, for the government, as there are fewer import duty losses due to black market activities. An illustration of this possibility is that a 30-50 per cent import duty on handsets makes them attractive for the black market to supply because of the opportunity for a good profit margin. A 5-15 per cent import duty reduces that attractiveness. It is a well-known general concept that a black market is likely to occur where there is excessive taxation.

A country with high taxes on ICT equipment and services could initially do more for network and access expansion by reducing taxes than by implementing a UASF or any other special UAS measures. Reducing taxes is easier than establishing a UASF and implementing a UAS programme, though it might be politically more controversial. Also, tax reductions can be used selectively to support the UAS objective. In Malawi, the 2007 draft Universal Access Policy foresees, as one of its key measures, to exempt low-cost end user terminals (e.g., mobile handsets and CDMA fixed phone sets) from the import duty, as well as reducing VAT on small denomination pre-paid cards by 50 per cent. In Mozambique, operators can apply to the Investment Promotion Center (CPI) for some fiscal and tax benefits, and operators have received tax exemptions for investments in (rural) network roll-out.

Another form of incentive that lowers the barrier to providing services and offsets the initial start-up costs is tax forbearance for a limited time period or tax rebates offered on a sliding scale. There are numerous opportunities through tax benefits to help encourage investment.

END NOTES

1. See GSMA, *Tax and the digital divide*, 2005.

2.1.6 The removal of pre-liberalization obligations

A central tenet of the privatization process is that a level playing field must be created for all operators, including recently privatized incumbent operators. The potential burdens and opportunities of a market should be equal amongst all participants.

As such, pre-existing universal access and service (UAS) obligations must be dismantled in order for there to be fairness in the market. The incumbent, ex-monopoly operator has often been shouldered with the burden of serving rural areas (even if inadequately) at the behest of political interests. The incumbent should be given the option to retreat from those areas where it does not wish to provide a communications service, including areas where it believes existing service provision is economically unviable.

Should an incumbent operator decide to withdraw its UAS service offering from an area, it should make adequate provision for a delayed departure and a handover to any potential buyer. If no buyer is interested in acquiring the network or service area targeted for withdrawal, this may trigger the implementation of a UAS (subsidy) plan. Of note is the importance of technology neutrality when either identifying or licensing a new operator to provide network and service. New technology – whether mobile, an IP network or broadband wireless – tends to reduce costs, can offer more services and therefore has the ability to turn economic loss into gain.

An example of how to deal with pre-existing obligations is the approach Botswana was considering in 2007. BTC, the fixed incumbent operator, stated during stakeholder consultations on UAS policy that it had to continue to operate rural networks that previously received initial capital subsidies but are chronically loss-making. Fundamental issues with regard to this situation may include the following:

- Many of BTC's fixed rural networks may not represent the ideal or least cost solutions for rural service provision; and,
- In the newly liberalized UAS regime, BTC should not necessarily be required to continue offering end-user services in areas where they are uneconomic and have been replaced by mobile options.

In order to address this situation, the following approach could be taken: BTC is required to declare in detail which of the rural communities they consider unviable and for which they would like to cease operation. Once these details are known, one of the following three options is recommended:

- BTC be permitted to cease providing services in areas where the services are redundant because of existing mobile service provision;
- BTC sell all or part of its non-economic facilities to another interested operator; or
- Areas now unable to be operated economically by BTC as fixed networks should be bid as new UAS subsidy competitions under the competitive least-subsidy rules.

RELATED MATERIALS

Module 3, "Authorization of Telecommunication/ICT Services", section 8.3, ["Unified and Multi-Service Licensing"](#)

2.1.7 Timing of a universal access and service programme

There are several reasons why the timing of a universal access and service (UAS) programme must be carefully considered, as well as

linked to the liberalization process. They are:

- If a best practice UAS programme is implemented before major reform measures have been taken, it has a high risk of failure or of being ineffectual. It will be more costly, as the market does not operate efficiently; subsidies will be used for areas that could be commercially served in a better regulated market, leaving less subsidy for areas that truly need it;
- If a UAS programme is implemented too early, before the market has had an opportunity to work efficiently, or while it is still in a period of major expansion, the UAS programme can quickly become outdated; and
- If a UAS programme is implemented before existing pre-liberalization obligations are addressed, it can face major disruptions and pushback from the incumbent.

When is the right time to implement a UAS programme? Regulatory reform can go on for many years and with ongoing developments in the sector like convergence or broadband development, improving and adapting regulatory efficiency is a never-ending endeavour.

The following recommendations are made in regards to pre-requisites for implementing effective best practice UAS programmes that rely largely on competitive allocation methods for funding and on working with the industry to achieve UAS. These recommendations should be regarded as minimum regulatory reform requirements:

- The majority of the main operators should be privatized [1]. That does not mean that operators cannot still be government-owned; a possible scenario is that the government owns less than 50 per cent, i.e. has no controlling interest;
- The regulator, if recently established, needs to have had sufficient time to establish a minimum amount of capacity, trust and credibility within the industry, and a demonstrated ability to make regulations free of vested interests, which are evidence-based and have been developed in consultation with stakeholders;
- The sector and its sub-sectors, such as public telephony, long-distance transmission, mobile, Internet, etc., should have a minimum amount of competition, e.g., at least three competing major service providers and prospects of further opening of the market (plans to issue more licences or authorization or set full liberalization dates); and
- Policymakers and regulators should have a clear view of which areas or population groups are clearly underserved with certain services despite some considerable regulatory reform. Through consultation with the industry, it should be clearly established that these areas and groups would indeed not be served in an acceptable amount of time. This is when special measures are taken and a UAS programme is implemented.

However, even if some of these pre-requisites are not yet achieved, it is still possible to develop a UAS policy. It is even advisable, as the development of a UAS policy can take up to a year, since it requires inter-governmental co-ordination and agreement, public and industry consultations, and an assessment of the sector status quo. Also, subsequent changes to laws and regulation and the development of additional regulatory instruments, take significant amounts of time.

END NOTES

1. Privatizing incumbent operators has become increasingly difficult in some countries. Not every incumbent public operator will be desirable to private investors. However, while a complex endeavour, there are ways to make them more attractive to buyers.

2.2 Impact and importance of competition on Universal Access

Competition, intrinsically linked to universal access and service (UAS), promotes UAS in the following ways:

- Competition drives expansion (i.e., coverage and availability), as discussed in [Section 2.2.1](#);
- Competition lowers prices (i.e., affordability), introduces new pricing models and promotes better quality of services, as presented in [Section 2.2.2](#);
- Competition encourages market segmentation and stimulates the introduction of innovative new services (i.e., more choices and new services); and promotes the servicing of the less affluent, through removal of non-price barriers (see [Section 1.2.2](#)) and subscriber growth, as outlined in [Section 2.2.3](#); and;
- Competition makes universal access and service fund (UASF) tenders for subsidies to provide UAS successful; it often needs more than two major operators in the market for a UASF tender to work;

An openly competitive marketplace is essential for the delivery of communications services to those who had no such service before. For example, fixed telephone penetration in India reached only 2 per cent of the population in the 50 years following independence, 1947-1997. However, industry reforms, including competition and other regulatory measures, launched in 1998 had, by 2008, propelled penetration (including mobile) to almost 20 per cent. The Indian mobile phone market in 2007 had 220 million subscribers and this figure is growing by more than 6 million users per month. [1].

Research shows that privatization can significantly lead to improved performance regarding increased sales, profits, investment and employment. Across the board, this research also finds that competition drives the greatest improvements in the sector [2]. For example, markets operating with a duopoly are less able to realize the benefits of free competition, as there is not enough incentive to capture market share by expanding service, or by lowering prices. Collusion between the two operators on keeping retail prices high is also a potential concern.

For more information please also see the ICT Regulation Toolkit, [Module 2: Competition and Price Regulation](#).

END NOTES

1. The Financial Times, August 2007
2. Wallsten, Scott, p 5. Does Sequencing Matter? Regulation and Privatization in Telecommunications Reform, Policy Research Working Paper 2817, The World Bank 2002

2.2.1 Competition and coverage

Competition encourages expansion of networks and services as a result of a general increase in the available investment capital necessary for providing services; this expansion is due to an increased number of operators involved. Another benefit of the competitive environment is that currently marginal or uneconomic areas may be offered services based on expectations of demand growth and competitive pressure for operators to position themselves as first in and establish their brand.

The expansion of networks is particularly true of mobile or wireless communications as the infrastructure needed is far less expensive to roll-out and has a greater ability to reach more territory (and therefore more consumers).

Countries that introduced (mobile) competition early and/or licensed more than two operators achieved high signal coverage and considerable penetration. This has to be seen in conjunction with other important indicators. For example Pakistan and India, both having GDP per capita of around USD 600, and with roughly two-thirds of their population being rural, have done quite well in terms of coverage and penetration is increasing. Same applies to Nigeria. The table below shows countries that were analyzed in more detail, including the number of wireless operators, and key socio-demographic data.

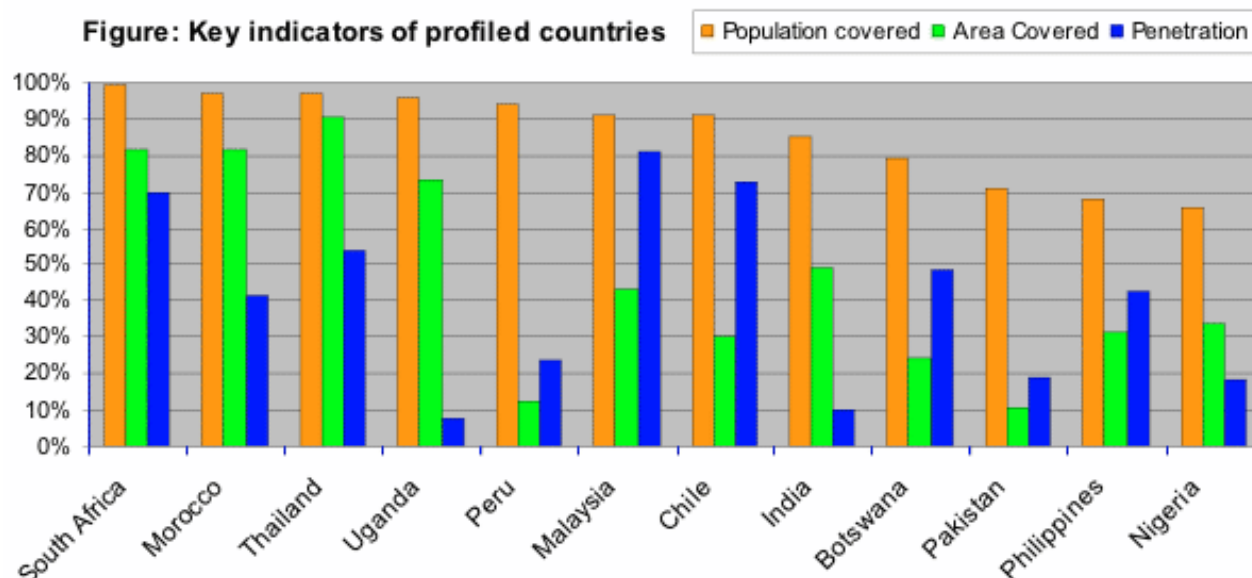
Table: Country comparison of pop. coverage, geographical coverage and penetration (GSM only) [1]

Country	Population	% Urban	Per cap GDP	Per cap PPP	Gini Index	Geog. Area	Population density	No. of GSM operators	% of Pop covered by GSM	% of Area covered by GSM	Q2/2006 GSM teledensity
Botswana	1,720,000	54.0%	\$5,014	\$10,500	63.0	600,370	2.9	2	79.5%	24.4%	48.7%
Chile	15,956,000	87.0%	\$5,898	\$11,300	57.1	756,630	21.1	3	94.0%	30.3%	51.2%
India	1,079,721,000	29.0%	\$641	\$3,300	32.5	3,287,260	328.5	8	60.9%	39.0%	7.5%
Malaysia	24,894,000	64.0%	\$4,672	\$12,100	49.2	329,740	75.5	3	91.7%	43.5%	81.1%
Morocco	29,824,000	58.0%	\$1,637	\$4,200	39.5	446,550	66.8	2	97.3%	82.0%	41.4%
Nigeria	128,709,000	47.0%	\$516	\$1,400	43.7	923,770	139.3	4	71.8%	33.9%	18.4%
Pakistan	152,061,000	34.0%	\$632	\$2,400	30.6	796,100	191.0	5	36.0%	7.4%	18.8%
Peru	27,562,000	74.0%	\$2,483	\$5,900	54.6	1,285,220	21.4	2	56.6%	6.3%	11.2%
Philippines	81,617,000	62.0%	\$1,041	\$5,100	46.1	300,000	272.1	3	68.3%	31.2%	42.5%
South Africa	45,509,000	57.0%	\$4,668	\$12,000	57.8	1,219,090	37.3	3	100.0%	81.9%	69.6%
Thailand	62,387,000	31.0%	\$2,621	\$8,300	42.0	514,000	121.4	4	97.1%	90.5%	53.7%
Uganda	27,821,000	12.0%	\$264	\$1,800	43.0	241,040	115.4	3	96.3%	73.3%	7.5%

Source: Universal Access – How mobile can bring communications to all, GSMA 2006 (Data from 2005 and 2006)

The graph below shows the percentage of population covered by wireless signal, the percentage of geographic area covered, as well as the actual wireless subscriber penetration. Almost all of the countries that have achieved high service coverage have three or more mobile operators. Also, in almost every case where transition from slow to rapid growth in population coverage is observable, an increase in the number of operators, to more than two, is at least partly responsible for this growth. Good examples of this are Pakistan and India, both of which experienced rapid growth between 2003-2006 and which currently have five and eight mobile operators respectively.

Figure: Key indicators of profiled countries



Source: Universal Access – How mobile can bring communications to all, GSMA 2006

Even the threat of impending liberalization can result in existing operators creating a growth spurt. This was seen in Morocco when large scale coverage growth occurred just prior to and during the roll-out period of the second mobile operator. There is less evidence, though, that a very high number of operators is conducive to reaching out into remote rural areas, as market fragmentation could reduce the incentive for expansion.

Uganda and South Africa as examples of competition and coverage

Although they have widely differing economies, both Uganda and South Africa show the impact of liberalization, competition and policy leadership in the mobile sector, and both have achieved high population and geographic coverage.

South Africa's mobile market has had competition since the mid 1990's. Encouraged by an aggressive government policy that required mobile operators to meet roll-out targets and to provide public access telephones at concessionary prices, the operators were reaching over 80 per cent of the population and 50 per cent of land area before 1999.

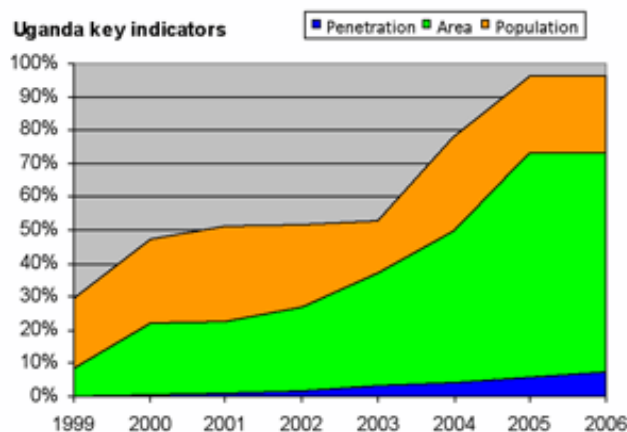
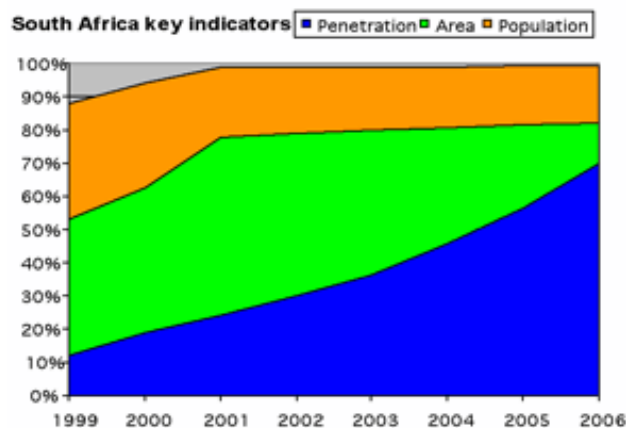


Figure Sources: Universal Access – How mobile can bring communications to all, GSMA 2006

Uganda's story illustrates the immediate impact of competition. The second national operator received its licence in 1998. Prior to this, the country had an ineffective incumbent fixed line operator and one mobile operator with only limited coverage. Rapid roll-out of the new entrant led to 50 per cent population coverage within less than two years. The granting of a third mobile licence to the privatized incumbent led to a second stage of rapid expansion from 2003 to 2005. Under this second growth stage, the operators together covered 96 per cent of the population in 2006. Subscriber penetration though is still low, largely due to the cost of handsets and high taxes on telecom services.

END NOTES

1. Combined mobile cellular coverage (all technologies) in some countries might be higher than is indicated in this table

2.2.2 Achieving affordability and improved service

An increased level of competition generally has the effect of lowering prices which can expand the market through price elasticity of demand. Competition also lowers the access barrier for new subscribers through new and innovative pricing options, as well as shared or public access. Therefore, the consumer stands to gain from the price effects of competition. Operators are generally driven to increase their efficiency and reduce costs by a need to be more competitive in the market and increase the subscriber base. A lowering of prices, which is operationally feasible for the operator helps to close the market gap.

An integral part of the service quality package is to offer reliable communications services with greater customer support and to a wider service area. This availability and reliability increases the attractiveness of the service offering which leads to greater use and increased economic viability.

Competition generally improves the quality of services, though periods of rapid growth may temporarily lead to lower quality of service provisions. However, similar to the rationale behind a lowering of prices, improvements to service quality is driven by each operator's desire to differentiate itself from competitors, and thus to further its brand.

Competition also allows customers to switch their service provider if they are unsatisfied with the quality of service. For example, operators in Nigeria, Mozambique and Malawi experienced a considerable amount of churn from customers when their networks were either too congested or had technical problems due to an upgrade, especially when the problem persisted for some time. In numerous countries, because SIM cards are cheap (often approximately USD 2.00), customers can easily switch to another provider if their existing service is poor quality.

Regulation that mandates number portability, a customer's ability to retain their phone number when switching service provider, facilitates both affordability and improved service as it is even easier for customers to switch if another service provider offers better rates or quality of service.

2.2.3 Market Segmentation and servicing the poorest

Competition causes greater segmentation of a communications market. This results in a stronger differentiation of customer groups and a variety of services that are more tailored for each segment. In the developed world, there are services designed specifically for teenagers and students who typically text message extensively, swap photos, frequently talk to specific groups of friends (and receive discounts for calls to those numbers), and call more on weekends. For example, the company Blyk in the UK offers a free number of calls and text messages to 16-24 year olds, which is paid for by advertising. In contrast, developing countries, especially for the third or fourth entrant mobile operator, the service focus often shifts to the rural or lower income segment of a country, leading to products and services suited for minimal spending and aimed at economies of scale.

Competition therefore also strikes at the core of the universal access and service (UAS) mandate, which is to reach the population that is currently unconnected and has no electronic communication medium at their disposal. As operators compete for more business, with it higher revenues, they look to consolidate the greatest share of subscribers (or users). While this race to subscribe tends to take place first in urban areas, due to higher income and easier network roll-out, the trend is to continue seeking new consumers where there is still profit to be made and then, where there is a future potential for profit.

Consequently, operators that are late entrants into the market may focus efforts on areas or segments of the population who are not yet subscribers to, or regular users of, an existing service provision. New operators, unencumbered by other sunk costs, previous obligations, or outmoded delivery concepts, may have very effective expansion into previously underserved areas, with or without a formal UAS subsidy. For example, Atelit (Life) of Ukraine is three years old and covers 90% of the population, and Mobitel of Sri Lanka who installed 300 base stations within only 18 months of existence.

In addition, competition is increasing the variety of services on offer. In order to attract or to hold consumers through service or product differentiation, an operator will tend to offer more products, using various technologies or innovative pricing packages. The desire to provide innovative services and products includes a commitment to using smarter technology that offers greater coverage, brings more applications, provides better quality, uses less power, and requires fewer resources to operate.

An example of an innovative technological solution for coverage is the increasing use of WiMAX, a communications technology that provides wireless data over long distances. The OECD notes that "the introduction of competition to markets has a profound effect on penetration rates, even when the competition comes via a different technology. Evolving wireless technologies such as WiMAX may dramatically increase the reach of backbone networks in developing economies, but other wireless technologies have already been implemented and have made a difference in competitive markets around the world" [1].

An example of innovation in services and applications is the trend towards new value-added services such as voice SMS (e.g., Bubbletalk), daily prayers (e.g., The Ilkone), forms of entertainment such as horoscopes and sports scores, and updated commodity prices

via SMS, instant messaging over mobile, mobile e-banking (as seen in countries like the Philippines, South Africa and Kenya), VoIP over mobile, m-learning (mobile learning), gaming, and mobile TV.

END NOTES

1. OECD p18. Regulatory Reform as a Tool for Bridging the Digital Divide, 2004.

2.3 The UA market and how operators are addressing it

In the past, many countries were concerned that competition and private-sector market participation would leave their urban poor and their rural areas un-served, or at least under-served. The underlying perception was that the urban poor and rural areas could not be profitably served and would therefore be neglected by private operators.

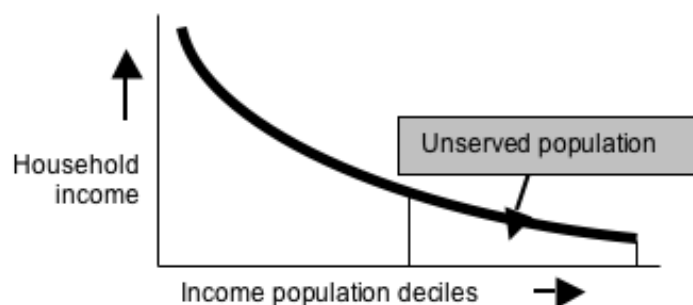
Increasingly, policy-makers and industry experts are altering their views of un-served and under-served areas, regarding them less as intractable problems and more as potential markets for investment. Clearly, this has been prompted by the success of mobile operators and their expansion into un-served and under-served markets. Also, there are models demonstrating how to serve the poor profitably; these are discussed in "The Fortune at the Bottom of the Pyramid" by C.K. Prahalad, a professor of corporate strategy and business consultant, who addresses a complex emerging market, the world's poor and the innovative business models that promise to end world poverty.

[Section 2.3.1](#) examines the universal access and service (UAS) market in detail by looking at sources of revenue of operators in rural and poor markets, and demonstrating that potential revenue is not limited to the expendable income of the rural poor. [Section 2.3.2](#) provides a practical demonstration that low Average Revenue Per User (ARPU) does not imply a lower profitability for operators.

2.3.1 Sources of operator revenues in rural areas

Decreased per-subscriber revenue with increasing reach is a general assumption (see figure below); to effectively reach low-income areas and increase penetration to poor users, a lowering of certain user prices – specifically the lowest possible tariff to secure and maintain access, as well as the minimum pre-paid card top-up denomination – is often necessary. However, the operating model need not necessarily be so limiting from the operator's perspective. Operators' revenues when serving rural areas are not limited to the apparent outgoing marginal revenue generated by the rural users themselves.

Figure: Decreasing per-subscriber revenue with increasing reach



Source: ITU-infoDev ICT Regulation Toolkit – UA Module

Many demand studies have observed that the vast majority of rural citizens have relatives, friends and business correspondents in urban areas [1]; the urban relatives earn more and are usually willing (or expected) to assume the larger share of the cost of communication. This is often achieved by "beeping" a technique employed by users trying to avoid the costs of calls. To "beep", a user makes a call, lets it ring briefly, and then hangs up before the call is answered, incurring no charges. Beeping practice is reported to be so widespread in Africa that operators have had to develop explicit "call me" services for a minimal fee to avoid the short call and hang-ups that are swamping networks [2].

Another consideration is that not all rural people are at the bottom of the income distribution curve; even in un-served areas, there is a diversity of household incomes which include at least some lower-middle income deciles.

Thus, there are at least five sources of marginal revenue from rural expansion. These are the following:

- The rural inhabitants who will spend a certain percentage (typically in the range of 3-5 per cent) of their household incomes on telecommunication services;

- Rural institutions – government, schools, clinics and their staff – these are additional to the expenditures of rural inhabitants and are essentially government expenditures; then there are also national or international NGOs;
- Urban inhabitants travelling into rural areas for business or personal reasons;
- Calls originated by urban relatives and correspondents, either in response to “call-me” SMS messages, “beeping” or other means of reverse charging used by low income people; and
- Calls originating in the rural areas after the receipt of electronic air-time top-ups for pre-paid phones transmitted from urban to rural relatives, where operators offer such services.

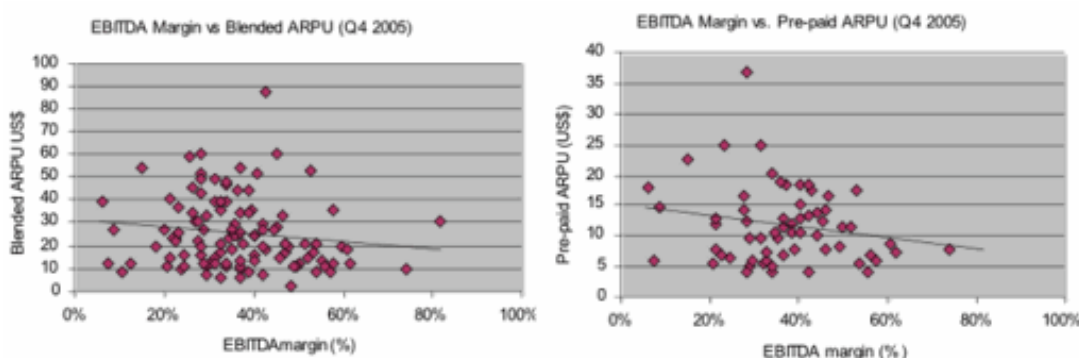
END NOTES

1. For example, a national demand study (5,000 interviews) in Nigeria, carried out for the regulator, NCC, 2005, 89 per cent of rural people reported having relatives in a major city and 39 per cent had relative(s) abroad. This result is typical of many developing countries.
2. Africa: Phone credit low? Africans go for “beeping”, Reuters 26 September 2007, see also Jonathan Donner, “The Rules of Beeping” in the online Journal of Computer Mediated Communication in October 2007

2.3.2 Low ARPUs are not an insurmountable barrier for operators

Companies operating in a low Average Revenue Per User (ARPU) environment are often as profitable as companies in high ARPU situations. For example, Philippine operators have some of the lowest ARPUs and highest reported Earnings Before Interest, Tax, Depreciation and Amortizations (EBITDAs) in the world, and Indian operators' EBITDAs have increased significantly over the last two years, while ARPUs have reduced. An analysis of 61 operators confirms this as shown below.

Figure: EBITDA margin compared with ARPU



Source: Universal Access – How mobile can bring communications to all, GSMA 2006

Philippine operators have creatively marketed their services with products such as micro-refills (less than USD 1.00), m-banking and related services that are well-suited to securing market share and customer loyalty with low income and rural customers. The Philippine operators, as well as operators in India and many other countries, also have very low tariffs for low-usage customers, allowing their customers to stay connected for less than USD 2.00 per month. The operators have also reduced their own distribution and other internal costs through measures such as “e-Load” (electronic prepaid top-up). A recent benchmarking study of Indian mobile operators has also shown increasing EBITDA levels due to economies of scale and cost-cutting measures over the last three years, as ARPU levels have decreased [1].

END NOTES

1. *Indian GSM Cellular Benchmarking Study 2005*, PriceWaterHouseCoopers, Cellular Operators Association of India (COAI)

2.4 Regulatory measures to improve UAS

[Section 2.1.1](#) discusses which specific liberalization and reform measures are recommended before a universal access and service (UAS) programme is implemented and what challenges occur if these regulatory measures are not taken. [Section 1.3.3](#) demonstrates that a good, enabling regulatory environment leads to an efficient market, which in turn leads to improved UAS, and [Section 2.2](#) covers in detail how

competition promotes UAS. In a broad sense, all key regulatory measures discussed in this ICT Toolkit ultimately improve UAS.

Every improvement in the regulatory environment will contribute to reduction in the total cost of ownership of a communications network and to improving service provision or lowering consumer prices. The end result is more viable network expansion. Thus these measures assist the market to expand its frontier and reduce the size of the zone requiring intervention.

However, within the broad regulatory topics such as interconnection, licensing, price regulation and spectrum management, there are aspects that demand further attention and options that can accelerate the achievement of UAS.

[Section 2.4.1](#), [Section 2.4.2](#) and [Section 2.4.3](#) present options on promoting UAS when awarding main licences, opportunities for UAS when moving to a new licensing regime, and other licence-related incentives.

[Section 2.4.4](#) discusses options for regulating spectrum use that could help rural areas being better served, especially with broadband, while [Section 2.4.5](#) explains the importance of tariff flexibility for operators, tailoring various tariffs both to customer demand and their corporate requirements to continue network investment.

[Section 2.4.6](#) explores the advantages and disadvantages of geographically asymmetric interconnection rates.

2.4.1 Designing licence awards to promote universal access and service

Licensing provisions can create a positive investment climate and increase the rate of network development through the application of appropriate, consistently applied regulations and incentives.

Operators can, and often do, make major contributions to universal access and service (UAS) under their main licences, either voluntarily, because it makes sense commercially, or through licensing obligations.

Although historically, the initial licensing of telecommunications operators has largely been kept separate from the achievement of UAS, there are clear connections between the two exercises of main operator licensing and UAS. The greater the network coverage put in place by main operators, the smaller the need for special UAS initiatives or funding arrangements (discussed in [Section 3.2](#)) to complete network coverage at a later date.

Licensing new operators to provide telecommunications services on a commercial basis is discussed in depth in [Module 3: Authorization of Telecommunications Services](#) of the ICT Regulation Toolkit. Decisions pertaining to the number of licences, the terms of licences, and the awarding of licences are often matters of national policy. They take into account difficult and conflicting factors, such as the following:

- The number of operators the market is thought to sustain in the medium term;
- Constraints imposed by undertakings to existing licensees; previously promised terms of exclusivity must be respected unless they can be negotiated down or away;
- Political pressures, often exerted especially to support vested interests; and
- The amount of money a licence auction could raise for the government.

Licensing decisions, and the level of interest from potential operators in a licence opportunity, usually rest on assessments of, or assumptions about, the commercial viability and profitability of the opportunity to be licensed. So long as network coverage is clearly beneficial, commercially, to main operators, it is likely to be provided without specific licence obligations. Considering the concept of market gaps (introduced in [Section 1.3.3](#)), if the regulatory environment is conducive to growth and expansion, main operators close the market efficiency gap without any special incentive or subsidy. However, licensing authorities often specify in invitations to tender, and impose in licence conditions, roll-out timetables for providing coverage in commercially viable areas in order to ensure that it happens as fast as desired.

Reaching beyond the commercially attractive market

To extend main network coverage to the limits of viability or beyond, various approaches may be used, including the following:

- Ambitious roll-out requirements, including some marginally viable areas, may be stated in the initial invitation to tender. So long as the licensing competition allows for extra costs to be reflected in lower bid offers, this approach should still lead to good competition. In practice, commercial roll-out has more often exceeded initial estimates;
- Roll-out requirements may be specified in ways that encourage desired results. For example, instead of saying “200,000 lines or customers must be operational by 2010” (which could be anywhere in the country), the requirement might read, “By 2010, commercial service must be operational in each of the following 50 named districts”. This focuses on a presence in chosen areas; and
- Instead of specifying the required coverage and asking bidders to compete on the fee they will pay for a licence (a common practice), the licence fee can be fixed at a moderate level and bidders asked to compete on the amount of coverage that they will commit to provide. This was done in Botswana’s initial cellular licensing in 1997 with results that were generally agreed to be successful. More information on the approach adopted is given in the Practice Note *Mobile telecommunications licensing in Botswana 1997*.

[Module 3](#) of the ICT Regulation Toolkit discusses the merits of different selection methods for licensees, including objective methods (auctions) and subjective methods (beauty contests).

Auction design is a complex matter, particularly when the competition has multiple goals, e.g., both raising significant revenues and increasing network coverage. There are no simple prescriptions for designing initial licence competitions that will achieve the best results, however, there is evidence that roll-out targets attached to mobile operator licences, provided they are explicitly stated in the licence competition, are often effective tools of achieving high population coverage. Examples of this can be seen in Morocco, which has coverage that currently reaches 96 per cent of population, and in South Africa, which has 99 per cent population coverage. The Ugandan case demonstrates the efficacy of this strategy, as operators were faced with a serve it or lose exclusivity clause in their licence and chose to serve most of the country [\[1\]](#).

The Reference Document *Workshop on Licensing of Third-Generation Mobile* also considers how different goals, including affordability and UAS, may be balanced. The Practice Note *Socio-economic benefits of lower authorization fees* in [Module 3](#) of the ICT Regulation Toolkit, says:

By setting licence fees at a reasonable level during the first years of market development, regulators can advance several policy objectives, including:

- The promotion of economic or social goals, such as universal access (UA) - often by requiring a certain extent of network coverage - or service affordability (by regulating retail pricing); and
- The spurring of competition by lowering barriers to market entry, exerting downward pressure on prices and stimulating innovation.

END NOTES

1. *Universal Access: How mobile can achieve coverage and services to all*, GSMA, 2006, available at <http://www.gsmworld.com/>

2.4.2 Revising the licensing regime or issuing new licences

With the need to respond to convergence, and moving towards simpler class or general authorizations by issuing technology neutral or even unified licences, regulators have a major opportunity to incorporate universal access and service (UAS) objectives. Any requirements added later are generally accepted in the context of an overall review of the regime or licensing process.

It is key that the new licenses balance costs and benefits. In the interests of technology neutrality or simplified authorization regimes, some countries, like Malaysia and Nigeria, have already implemented converged or unified access licences. Tanzania and Kenya are also moving in that direction. Where this happens, a transition mechanism is needed for existing licensees. There is an opportunity here to extend UAS requirements, in return for the greater flexibility offered by the new regime. The new regime can also be a step towards removing old restrictions on UAS licensees.

South Africa has a couple of examples of adding UAS obligations to new licences. ICASA, the industry regulator, granted Neotel, a new entrant operator, licences for providing Public Switched Telecommunications Services (PSTS) and Value Added Network Services (VANS). Neotel is entitled to apply for such radio frequency spectrum as may be required for the provision of its services, and has obtained the spectrum from ICASA necessary for it to provide the various services in its service portfolio, including a 3G licence. As part of its Community Service Obligations (CSO), Neotel has to provide high speed Internet connectivity to 5,000 public schools, Further Education Training Institutions (FETs) and rural medical clinics in South Africa.

South Africa's two mobile operators, Vodacom and MTN respectively, made applications for access to the 3G frequency spectrum bands and these licences have been issued subject to the condition that they each provide Internet access to 5,000 public schools and 140 institutions for people with disabilities, including 1,400 terminals to those institutions for people with disabilities.

In Brazil, after the telecommunication sector was deregulated in 1997, the regulator Anatel, established licensing provisions that allowed operators to have the opportunity to obtain additional licensing authorizations that included providing mobile and international long distance services once their Universal Service Obligations (USOs) were reached. For example, by 2004, Brazil Telecom had met its USOs and was able to roll out additional mobile and long-distance call services in southern areas where it previously only had licences for providing local services. In addition, Anatel is pursuing now broadband UAS targets, planning to connect all of its 5,600 municipalities with minimum broadband capacity, as well as creating and connecting 8,500 telecentres and 50,000 urban schools. Anatel used their 3G tender to achieve coverage throughout the country, by matching profitable areas with less attractive ones. For example, Anatel paired Sao Paulo with the poor North-East region, and was willing to accept a lower tender amount (i.e., the government made less money from the auction) in exchange for mobile coverage in all regions. While only 1,836 municipalities currently have mobile services, all municipalities will soon have mobile and 3G services as a result of the 3G tenders.

A potential approach to combine unified licences and UAS objectives could be to offer the unified licences at different levels of licence fees depending on whether the operator chooses to accept UAS requirements. This would still allow the operator to choose whether to play or pay, however this approach has not been put into practice so far.

2.4.3 Other licence incentives to promote universal access and service

Licences as first issued, may not provide optimal support for universal access and service (UAS). This may happen when initial conditions or other factors affecting licensing decisions become inappropriate with the passage of time or because technology advances and cost savings result in changed situations. Either way, the question arises of what is the best scenario for main licensees to work towards universal access UA within their existing licences.

Incentives & opportunities through trade-offs

Incentives for further network expansion can be provided in the form of reduced contributions to the Universal Access and Service Fund (UASF) or through licence revisions that promote expansion. For example, in its Unified Licensing proposals, the Telecommunications Regulatory Authority of India (TRAI), recommends that a licensee which covers 75 per cent of development blocks in any service area (excluding the four Metro service areas), should be eligible for a reduction in the Universal Service Obligation (USO) fee; such a licensee would pay only 3 per cent instead of 5 per cent. In other jurisdictions, financial penalties have simply been imposed for failure to achieve specified roll-out targets, or the targets have been accepted in return for benefits such as extended exclusivity.

Some operators or service providers tend to favour UAS commitments based on incentives that either reduce their contribution to a universal service levy or that can be accepted in exchange for commitments by government to reduce taxes and import duties on end-user equipment or network infrastructure, or to reduce valued added taxes on ICT services. Taxation is a significant hindrance to network and service development in many countries, and taxation on ICT services (e.g., air-time) or phones and computers are more likely to impact lower income users, who are on the margins of affordability, hence such arguments from private industry are very relevant to UAS [\[1\]](#).

Non-costly activities or those covered by corporate social responsibility

Some activities by operators support UAS at a marginal cost to them and may be undertaken without explicit financial incentives. For example, installing showpiece multimedia rooms in schools, supporting village phone initiatives (see [Section 3.4.1](#)) in areas that already have network coverage, and making suitable terminals available for hearing impaired users could all be justified in a corporate social responsibility programme, which benefits the reputation rather than the finances of the operator. During Botswana's consultation on UAS policy it was suggested that operators undertake promotional activities (such as options for serving physically challenged customers) in consultation with the regulator as part of their contribution toward achieving universal service in designated urban and high population areas.

Regulators can encourage such activities by publicising their own initiatives and their appreciation of operators' initiatives, by requesting an annual corporate social responsibility report from each operator, or by instituting awards schemes.

END NOTES

1. [Tax and the Digital Divide, GSMA](#), 2006.

2.4.4 Freer use of spectrum in rural areas

[Section 2.1.4](#) provides a general introduction to the issue of spectrum licensing for broadband and universal access and service (UAS). This section continues the discussion related to the use of licence free spectrum allocation in particular for rural areas. For spectrum related topics also see the ICT Regulation Toolkit Module 5: Radio Spectrum Management.

The popularity of mobile services and the introduction of new wireless technologies over the past few years have dramatically increased the demand for spectrum. As a result, countries are looking at new ways to manage spectrum use more efficiently. As part of this effort, increased amounts of spectrum are being allocated on a common basis, i.e., to license free use in order to exploit the potential of technologies such as Wi-Fi and WiMAX, to propel the rapid expansion of affordable high-speed access in both rural and urban areas [\[1\]](#).

There are a few cases upon which spectrum costs can be reduced or eliminated for rural network expansion, and in particular for investments sponsored under Universal Access and Service Fund (UASF) competitions, as noted in [Section 2.1.4](#). However, not all countries have embraced the idea of allocating spectrum to unlicensed use, for reasons such of revenue loss or potential spectrum congestion. However, these perceived downsides need to be compared with the potential of these technologies to provide more economic and accessible broadband access. Furthermore, in largely rural areas where congestion is less of a challenge than in urban areas, it is primarily the license fee revenues that are at stake. Potential revenue loss from forgoing licensing fees could be offset by substantial savings (and increased market efficiency) in terms of fewer disbursements of UASF subsidies.

Alternatives such as levying small fees attached to the cost of purchasing equipment that are used in unlicensed spectrum, such as Wi-Fi routers, could eliminate the need for a licence to operate in a particular frequency band while still providing revenue to the government [\[2\]](#).

In 2004, a study was conducted regarding the regulation and use of 2.4 and 5 GHz bands (frequencies used by Wi-Fi and WiMAX

technologies) in Africa, exploring opportunities for a licence exempt wireless policy [3]. The study focussed on the opportunities for Internet development throughout the continent, as well as UAS in rural areas. Interestingly, while Wi-Fi and WiMAX are typically used for urban hotspots and urban broadband, the study found that in over a third of countries polled, technologies using the 2.4 and 5 GHz bands were being used for backhaul network connectivity in rural areas.

Key findings of the study were that while some countries did not require licences for those frequency bands, there were increased restrictions on power, range and service use (i.e., data only), and requirements for end-user equipment certification that posed barriers for expansion and innovation. While there is, of course, a need to guard against interference, and to protect quality of service and consumer rights, the study found that those imposed limits and requirements were usually too restrictive and not up to date with technological improvements and actual problems in the sector, and were rather pre-emptively imposed.

The general heterogeneity of regulation of the 2.4 and 5 GHz bands across the African continent is also considered to create confusion and uncertainty among ISPs, investors and technology suppliers and to limit potential for economies of scale. Clearly, regional harmonization and removing unnecessary barriers will increase innovation, expansion and UAS progress.

The practice note *Ireland's regulation of broadband wireless access* in [Section 2.1.4](#) highlights the approach of ComReg to allow both high emission use of unlicensed bands as well as use of the same for backbone, to reduce the cost of backhaul in rural areas.

END NOTES

1. ITU Trends in Telecommunications Reform 2007: The Road to NGNs (Chapter 7: NGN and Universal Access)
2. Ibid
3. Licence-exempt wireless policy: Results of an African Survey, Isabel Neto, Michael L. Best and Sharon E. Gillet, 2004

2.4.5 Tariff flexibility

Many policymakers prefer keeping tariffs low, especially in rural areas, as they know affordability is lower in rural than in urban areas. This follows common practice and policy in many industrialized countries but it is not always transferable to developing countries where operator revenues are smaller and the task to build-out the network to the entire country still lies ahead.

To the contrary, this often has the opposite effect of what is desired. If operators are not allowed to charge commercial tariffs in the more costly rural areas, they have little chance of recovering their cost and making a profit. In consequence, they tend to avoid serving rural areas. If they are forced to serve rural areas by obligations, they try to minimize their attention, effort and resources as this is a loss-making operation for them. This results in either very poor services or no service at all.

The ultimate objective of universal access and service (UAS) policy is affordable services for all, including rural areas. However, in some countries with very high-cost areas it might be beneficial for an interim period, of three to five years depending on the situation, to allow operators to charge slightly above urban tariffs, as a reflection of their costs. This would motivate providers to build out infrastructure in rural areas. Again, the best evidence that this scenario works, are the many mobile operators in Africa that were free to charge higher tariffs; the combination of tariff freedom (or at least greater tariff flexibility) and competition has allowed mobile operators to grow more rapidly and venture into rural areas.

Furthermore, the rural customer often develops innovative cost-minimizing ways of using the network to their advantage once it arrives, e.g., through sharing phones, use of SMS and of call-back or beeping their urban contacts who are willing to pay for the calls.

Despite regulators' statutory independences, regulators are sometimes under pressure from politicians and special interest groups to regulate or control prices in competitive markets. Prices for service typically begin higher than many people would like, but this enables operators to achieve their early investment targets and develop the market. Almost without exception, where competition is strong, the need to drive penetration to higher levels (i.e., to ever-lower income users) has led to price reductions with tariff package innovation and low-user options that, as noted previously, are beyond even the expectation of regulators and policy makers. Experience has shown that market efficiency is achieved with a light hand in regulation, with the regulator's main task to ensure a competitive environment where players who are dominant do not abuse their power.

Calling Party Pays

World experience shows that Calling Party Pays (CPP), combined with tariff innovation at the low end of the affordability curve, enables low-income users to be able to afford service and to use the network creatively and to have access to communications. Many developing countries have changed from Receiving Party Pays (RPP)/ Mobile Party Pays (MPP) to CPP and seen penetration rates rise significantly [1].

CPP also has benefits for the operator because, with low-end users' propensity to use SMS and incoming calls as their means of access, they are creating calls in the network that would otherwise not be made at all. CPP also encourages more users to use mobiles for business purposes since they are not burdened with any cost levied on incoming business enquiry calls [2]. This probably explains the relatively slow business user take-up of mobile communications in North America (which does not use CPP) as compared to Europe.

END NOTES

1. See for example Mobile termination charges: Calling Party Pays versus Receiving Party Pays by Stephen Littlechild, Telecommunications Policy 30 (2006) 242-277; Calling Party Pays or Receiving Party Pays? The diffusion of mobile telephony with endogenous regulation, by R. Dewenter and J. Kruse, Department of Economics Discussion Paper 43, Helmut Schmidt University, Hamburg, November 2005. On the other hand, Scott Marcus argues in ITU Trends in Telecommunications Reform 2007: The Road to NGNs (Interconnection) that RPP prepares regulators better for the transition to all IP networks and NGN networks which are expected to use the Internet based peering and transit model.
2. New technology is on the way which can improve tariff transparency to users (in particular, by displaying call charges on the phone screen both while a call is being set up and during the course of the call). If successful in the marketplace, we expect that this technology will provide new flexibility for charging and interconnection arrangements. It could allow real-time call price changes in response to changing loads, permitting a much more efficient usage of installed traffic capacity.

2.4.6 Geographically asymmetric interconnection

Disputes over interconnection, typically between mobile and incumbent operators or between other players and incumbent operators are perhaps the single most significant regulatory hindrances to rapid enjoyment of the benefits of liberalization. Key principles for interconnection are as follows:

- The terms of interconnection to be based on transparent, public domain procedures;
- Rates and practices to be monitored and enforced by an unbiased and independent regulator;
- Rates to be based on forward looking incremental costs for fixed incumbent operators; and
- There is a special need to account for the costs of network expansion into regional and rural areas during a country's development phase or for very high-cost areas.

Rural users receive more calls than they make, thus the incoming traffic to, for example, a rural wireless base station, may be considerably higher than the outgoing. This becomes a significant part of the business case. However actual per-minute costs for the operator are higher due to lower population density and higher capital and operating expenditures. Some form of geographically de-averaged terminating rate regime may be justified as both a measure to meet the costs of rural network segments, and an economically justified, non-subsidy measure to increase the commercial incentive for operators to invest in rural expansion. Whereas there is broad precedent for asymmetric interconnection rates between fixed and mobile worldwide, and between traditional fixed network urban and rural operators in North America, Chile and Peru, the application of this principle in the mobile industry and on a geographically targeted basis remains limited.

As is fully discussed in the Reference Document *Telecommunications Challenges in Developing Countries: Asymmetric Interconnection Charges for Rural Areas*, the reasons for this are twofold:

- As mobile operators typically still receive higher interconnection rates, there is less need for geographically de-averaged interconnection rates for rural areas; and
- The implementation of a geographically asymmetric interconnection regime adds complexity and entails some challenges.

In order to consider and implement an asymmetric interconnection regime, there should be a strong case outweighing the costs of implementing such a regime. For example, this could be challenging terrain or the requirement of high-cost technology. It might be necessary to create incentives to reach the last and most challenging 3-5 per cent of a country's population, possibly using satellite technology, VSAT or GMPCS. This might be the case in countries with extremely low population densities such as Botswana, Mongolia, parts of the Russian Federation, etc.

END NOTES

1. For a detailed discussion on asymmetric interconnection, see Andrew Dymond, *Asymmetric Interconnection Charges for Rural Areas*, World Bank Working Paper No.27, 2004

2.5 Enabling regulation for broadband

Ensuring that broadband services are widely accessible to people, public organizations and businesses wherever they are located is a major challenge for regulators and policy-makers around the world. The relatively high cost of establishing broadband networks has created inequalities between suitably connected urban and developed countries on the one side, rural areas and less developed countries on the other.

General good regulatory practice already discussed in this chapter, such as creating favourable frameworks that are incentive based and investment friendly, liberalization, technology neutrality and unified licensing (see [Section 2.1.1](#)), and providing fair treatment, also apply to broadband regulation, and can help facilitate the deployment of and access to broadband services by a variety of operators and technology innovations.

The following issues are of particular relevance to broadband development and regulation:

- Market liberalization and incentives for network deployment, including a discussion on local loop unbundling or access to wholesale products, in [Section 2.5.1](#);
- International bandwidth prices, gateway liberalization and national peering and spectrum for innovative wireless broadband provision, in [Section 2.5.2](#); and
- Planning for converged services with frameworks for non-traditional business models such as VoIP, including policy measures to stimulate demand, in [Section 2.5.3](#);

Promoting national and regional fibre backbone initiatives, open access and infrastructure sharing is also helping broadband development and is discussed in detail in [Section 3.4](#).

2.5.1 Market liberalization and incentives for network deployment

Regulation should facilitate the opening of the market to more operators and types of service provision, including liberalizing restrictions on foreign ownership. For example, with Pakistan's 2004 broadband policy, the government has lifted any restrictions on the number of broadband service providers in the market, and at the same time simplified the licensing process, converting data, ISP and electronic information service (EIS) licences into a single class licence.

Regulatory approaches in support of broadband development are generally faced with introducing market liberalization in the context of two main scenarios:

- Pre-existing telecommunications networks; or
- Under-developed telecommunications networks.

Strategies for pre-existing telecommunications networks look at issues of market entry of alternative service providers in an existing market traditionally served by one or more incumbent providers. Developed countries with existing services and providers, promote typically both service-based competition as well as infrastructure-based competition.

In developing countries with less developed networks, especially in rural and remote areas, the strategy usually focuses on infrastructure network development through market liberalization and promoting alternative wireless broadband provision.

Local loop unbundling

In some developed economies, broadband has been facilitated by regulating local loop wholesale including full local loop unbundling. This can make sense in developed markets with an extensive and well-developed incumbent fixed network, as it allows new entrant operators access to the end-user without having to invest heavily into network deployment. This encourages service-based competition. However, most developing countries are faced with a fundamentally different situation, where network deployment and growth still needs to be encouraged, and operators still need to recover their investment costs. Unbundled service costs would therefore be higher and a less attractive approach to encouraging service competition. Consequently, for few developing countries would local loop unbundling be the best approach. Instead, regulators in developing countries may need to offer incentives for network deployment, and network-based competition combined with backbone network sharing approaches (where required).

Incentives for network deployment

Promoting broadband network deployment in a competitive environment where operators' prime focus and revenue sources is still often in telephony requires a system of incentives to ensure evolution to broadband services. These can include the following:

- Consideration of tax incentives for fibre installation over cheaper methods e.g., microwave for network deployment;
- Determination if market conditions are conducive to establishing duplicate backbone networks or single networks in which competing operators utilize shared bandwidth; if the latter, create open access policies for backbone networks [\[1\]](#);
- Establish licensing allowing for infrastructure sharing and open access to broadband networks; and
- Promote site location of infrastructure network projects (fibre backbone) where they can be accessed by a variety of potential operators and promote open access policies.

An example of incentives that could increase broadband deployment include 3G operators, Telstra and Hutchison in Australia, who share wireless access network facilities to increase network coverage and lower costs for both operators. Another example is the case of the SINGAPORE ONE broadband backbone and cable network that is operated by the government of Singapore as a shared use network with open access and level operating conditions [\[2\]](#).

Incremental approach for rural areas

In rural areas where connectivity is a major challenge, incremental deployment plans that introduce broadband through multiple, dispersed projects and programmes can reduce the risk of expensive, nation-wide deployment schemes. While rapid nation-wide deployment is the objective, incremental deployment initiatives can serve as pilot that will provide valuable lessons and information about demand, support requirements, operating costs, etc. for both policymakers and regulators as well as industry and consumers. The Practice Note Two examples of incremental approaches: Tanzania and Macedonia explains this approach further.

END NOTES

1. See also GSR Discussion paper: Extending Open Access to National Fibre Backbones in Developing Countries, 2008
2. International Telecommunication Union 2006, Trends in Telecommunication Reform 2006 – Regulating in the Broadband World, P.56-57

2.5.2 International bandwidth, gateway liberalization and national peering

Competition in international connectivity (i.e., sub-marine cables) and access to services such as international and Internet gateways, is key to lowering the cost of bandwidth and broadband prices for consumers. Effective interconnection and gateway regulatory frameworks that introduce new models of sharing and collocation, and reduce barriers to existing private, government and international networks is important in encouraging existing and new market entrants to expand into broadband and other services.

An example of the process to liberalize the international gateway and secure bandwidth capacity at lower prices is described in the Reference Document *International Sharing: International gateway liberalization – Singapore's experience*. Singapore's Infocomm Development Authority (IDA) required the dominant licence holder to provide a reference interconnection offer (RIO), mandated co-location at the submarine cable landing station, mandated connection services and regulated prices, and co-ordinated the submarine cable landing process, offering a one-stop-shop. In the past, sub-marine cable providers had to approach several different government entities.

India's regulator, TRAI, has adopted a similar regulation.

With Pakistan's 2004 broadband policy, national and regional peering among local Internet Service Providers (ISPs) is prominent. This is to reduce the reliance on the still costly international IP backhaul. The policy goes even further by promoting the creation of a national Intranet to provide domestic IP services. It is expected that this also spurs the creation of locally hosted content and services.

2.5.3 Planning for converged services and stimulating demand

Regulatory approaches in support of broadband network development should take into consideration the eventuality of a convergence of multiple services (e.g., telephony, data and broadband) over IP networks. Approaches for co-existence of pre-existing services such as telephony and new competing services such as VoIP need to be considered and integrated in regulatory strategies as well as the evolution from non-IP networks to converged networks. High demand for new services such as VoIP and cost effectiveness of utilizing multiple network topologies and spectrum bands in service delivery of existing services (e.g., international calls), will be drivers for increasing demand for and deployment of broadband networks. Effective regulatory mechanisms need to be put in place to manage issues such as interconnection, use of spectrum and co-existence of traditional and new services.

Flexible allocation and technical uses of broadband spectrum

Effective spectrum management for BWA allows for a variety of technologies to be used to provide broadband and related services. Measures to consider in facilitation of favourable spectrum allocation include:

- Considering allocating certain spectrum freely on a licence-exempt basis. This will encourage broadband demand and network deployment as has been employed in many countries in WLAN applications using Wi-Fi; and
- Including measures in spectrum licensing that allow for technical flexibility in experimenting and extending spectrum capabilities.

Harmonized policies and approaches for VoIP and industry

The popularity of inexpensive VoIP services is creating demand for broadband network deployment and shared use of these networks. However, inconsistent regulation of VoIP services around the world have created conditions which in some cases undermine and in other cases favour providers of existing services. This has led to outright banning of VoIP services in numerous countries. Regulatory frameworks are needed that address key concerns of stakeholders through enhancing viability and fairness for co-existing industries.

The following measures could be considered in regulatory approaches:

- Regulatory frameworks used for telephone services are not well suited for application to VoIP providers and need to be adapted to the specific situation;
- New charge rate structures need to be identified as rates based on call termination and origin points become less relevant in VoIP;
- Complementary frameworks for interconnection agreements between circuit and IP based networks are required;
- Development of strategies that promote incremental change and adaptation;
- Identification and classification of VoIP services; and
- Development of transitioning approaches to full IP-based world.

Increasing public awareness and stimulating demand

Given the high costs of deployment of broadband networks, especially in rural and remote areas, the government needs to assist development by increasing public awareness and stimulating demand. For example, regulatory agencies could work in partnership with other ministries in promoting the development and extension of e-government services, which in turn stimulate demand for broadband

services. E-government services can improve citizen's opportunities and communications services for citizens, especially those in poor, marginalized segments of society who lack any other access to critical information, services, and opportunities. Approaches to promote broadband development include:

- Supporting local, relevant, Internet content in local language;
- Lowering the cost of end-user terminals through import duty and other tax reductions and possibly subsidizing broadband equipment in schools;
- Educating citizens about the benefits of broadband while further developing Internet skills;
- Providing a legal framework for e-commerce and other applications; and
- Ensuring that consumers have enough information on providers and pricing options as well as available technology.

The Practice Note Malaysia's broadband plan – stimulating the private sector gives details on how to include the promotion of broadband development in a national strategy, especially in under-served areas.

Finally, regulators need to ensure that consumers and the public interest are represented in the policy development process. Consumers need to have input into the process so that broadband strategies are in tune with public demand for broadband services.

3 Overview of approaches to universal access and service

CHAPTER 3 TRANSLATIONS

 [Version française \(PDF\)](#)

 [Versión Española \(PDF\)](#)

Chapter 3 summarizes the main approaches that policy makers and regulators use towards achieving universal access and service (UAS) targets. In [Section 3.1](#), the historical context of universal service (US) policy is outlined with a review of traditional, non-competitive (administrative) approaches that have been used primarily in developed countries over the past few decades. Traditional, non-competitive methods are not relevant to developing countries and are discussed to provide context only.

[Section 3.2](#) introduces the form of dedicated initiative gaining ground in liberalized markets - competition for subsidies from Universal Access and Service Funds (UASFs).

[Section 3.3](#) considers the importance of non-government and community-based initiatives in the development of sound UAS policy, including village phone programmes, community networks and public Internet access strategies.

[Section 3.4](#) describes the importance of an open access policy to key infrastructure such as backbone and international gateways, as well as options and models for shared network infrastructure.

[Section 3.5](#) describes some other approaches and initiatives towards promoting UAS, including the experience of co-operatives and rural or regional licences for telecom provision in rural areas. This section also discusses scenarios for which these models might be best suited, including for broadband development. It also gives an overview of local or community radio in various countries and lessons learned.

3.1 Traditional incumbent obligations

This section describes the recent history of universal service (US) and universal service obligations (USOs), drawing primarily on experience in developed countries. While not generally applicable to developing countries, the background of US and USO is important for understanding recent approaches and policies, as covered in subsequent sections.

The concept of US existed pre-liberalization and its characteristics and changes are discussed in [Section 3.1.1](#).

In relatively mature network environments, once targets have been chosen, (e.g., defined penetration targets for underserved areas, or the provision of public payphones in certain locations), and it has been determined that market forces alone cannot assure the achievement of the target, the regulator will likely make industry fulfil these targets. Methods of designating a US provider after market opening are discussed in [Section 3.1.2](#). [Section 3.1.3](#) presents methods of allocating US funding.

[Section 3.1.4](#) covers a method of raising funds for US through access deficit charges.

3.1.1 Universal service at the time of monopoly

Monopoly thinking is largely irrelevant for today's developing countries. A multitude of providers and investors provide great opportunities for latest technologies and network growth, but the consequences of history live on in the current situation of some developed countries, in the literature, and in some people's mindsets. In countries where liberalization is delayed because of political or legal obstacles, continuing to use traditional incumbent obligations should be considered only as temporary and interim measures, if at all.

Before liberalization, there was usually a single network operator in an area (or country); this operator had to fulfil whatever social obligations were required, particularly when these organizations were government departments. Universal service obligations (USOs) were often not explicit but were seen as part of the organization's general public service mandate. Specific recognition of any losses was rare and unlikely to be objectively supportable because there would be no suitable accounting information. When any losses were recognised, they were expected to be met by internal cross-subsidies. No unfairness was perceived because social obligations were in society's interest and the organization's customers, who ultimately bore the cost, represented most of society.

When liberalization was being considered, many incumbent operators initially used their social roles to help secure preferred arrangements for the new regime. When a fight against liberalization was lost, incumbents often argued in favour of access deficit charges or shared funding of USOs. This was often more to burden their new competitors than to gain significant, direct benefits for themselves [1]. Generally, the obligations were preserved and made explicit for the first time. There was little debate about the content of the obligations, and none about who should bear them: the incumbent was the only candidate. The obligations were often just a statement of existing practice. One such statement is found in the Practice Note *The residential service obligations of the incumbent in New Zealand in 1993*.

In a liberalizing market, imposing USOs on the incumbent operator alone is contrary to the objective of creating a level-playing field. However, some developed countries have used administrative USO designation, as discussed in Section 3.1.2, but the trend is now to more competitive procedures. USOs are often used by the incumbent operator as a reason to delay re-balancing tariffs, agree to fair interconnect agreements and provide access to its national backbone and international gateway at cost-based market prices. A liberalizing market moves away from forced obligations towards a regime where the cost of universal access and service (UAS) provision is shared proportionally among all industry participants and all players have an opportunity to participate in the provision of UAS, typically through a competitive mechanism.

END NOTES

1. *Universal Service Obligations in a Competitive Telecommunications Environment*, ICCP series no 38 (Patrick Xavier, OECD, 1995); and *Universal service in telephone history: a reconstruction* (Milton Mueller) *Telecommunications Policy* July 1993, pp 352-369.

3.1.2 Administrative USO designation after market opening

Shortly after market opening, developed countries often introduced administrative, non-competitive procedures for designating a company to fulfil a universal service obligation (USO). These procedures are used where there is only one candidate capable of fulfilling the USO, despite the sector being open to competition, because new entrants are still far from national service provision. Typically, only an incumbent was considered capable, as it often was already providing near-total fixed-line coverage.

Recognising this likelihood, the EU requires USO designation procedures to be “efficient, objective, transparent and non-discriminatory...” but not necessarily competitive. Where an open tender is not used, the EU prefers the designation to be:

- Open, in the sense that both the specification of the obligation to be fulfilled and the proposal of the designated provider are publicly available;
- Subject to public consultation;
- Broken down into components (geographic or functional), so that more than one company can be designated; and
- Of moderate duration.

Some EU countries have opted to make the operator with significant market power (SMP) in the retail access market, the universal service (US) provider.

With more mature liberalized market, the EU is moving toward more competitive designation procedures, led by new member states. Estonia broke new ground in 2006, by being the first member state to designate through an open tender procedure, an alternative operator as its US provider. This is the Finnish company Elisa, rather than the incumbent.

Administrative procedures may sometimes be appropriate in developing countries when the overhead of organizing competitive procurement is not justified. This could be the case if:

- The amount of work to be done is small, and one candidate is obviously well-placed to do it (e.g., a cellular company serving one or a few villages in a coverage hole);
- Local participation is a major element, and there is only one credible local participant (e.g., a local organization running a telecentre); and
- There are few potential suppliers and genuine competition among them is unlikely (e.g., if the opportunity is open only to a duopoly of existing licensed operators).

Administrative procedures may also be preferred if the country lacks the capacity to organize and run a fair, open competition.

Guidelines for administrative procedures

Guidelines for administrative procedures should be based on the principles of **transparency**, **objectivity** and eventual **contestability**. The procedures must include the following:

- Specification of the task to be fulfilled, with concrete and realistic goals, including the time in which it must be fulfilled;
- A proposal by the organization that is to fulfil it;
- A review and verification that the proposal is of the required standard; and
- A contract between the regulator (or other awarding agency) and the fulfilling organization, that clearly states what is to be done and which provides recourse in case of inadequate performance. A contract would also spell out any financial arrangements and limits of

compensation for the operator, if any.

Contestable USOs

Between 2001 and 2004, Australia had an experimental period of contestable universal service obligations (USOs): though Telstra retained the obligations, other companies could offer or compete to undertake them and receive the subsidies in specific areas, in place of Telstra. No other companies actually came forward with offers, but the experiment was seen as a valuable demonstration that USO subsidies received by Telstra were fair. A summary of the experience and lessons learned is provided in the Practice Note *Australia and contestable USO provision*.

3.1.3 Administrative allocation of universal service funding

As soon as funding is available for providing universal service (US), it becomes more interesting to providers. With funded US provision, it is possible to award service contracts and funding by competitive tender as discussed in [Section 3.2](#) and in more detail in [Chapter 7](#). But where networks are already well developed and the obligation is primarily to maintain existing facilities rather than to install new ones, the incumbent will often be much better placed to fulfil the obligation than any new entrant could possibly be. In these circumstances, administrative procedures for allocating universal funding have been developed. Administrative procedures exist, for example, in the USA, Canada, Australia, and France.

Estimating the costs of universal service provision

All procedures for administrative (versus competitive) payment of compensation to operators, which receive or accept universal service obligations (USOs), are based on calculations of the costs that the company incurs in fulfilling USOs. Usually, these are net avoidable costs. An EU study [\[1\]](#) provides a full explanation of the relevant economic theory and its application, in which:

- “Net” means that the benefits that the company receives from fulfilling the obligation are subtracted from the costs. These benefits include revenues directly attributed to the obligation, such as revenues paid by customers who are connected because of it. Sometimes they also include indirectly attributed revenues, such as those for inbound calls to the subsidised areas. Sometimes they also include intangible or intrinsic benefits, such as those listed in the Practice Note *Potential advantages in being a USO provider*. These are difficult to estimate but may be significant; and
- “Avoidable” means that costs will only be taken into account if they would not be incurred without the obligation. For example, if a remote customer is served from an existing exchange, the incremental cost of connecting him to the exchange is an avoidable cost, but the cost of the exchange itself is not avoidable.

Calculating relevant costs and benefits for USO funding purposes is a major undertaking. Cost calculations in telecommunications are never clear-cut, they involve elements of judgement and attributions that are to some extent arbitrary and estimated. Because large inter-industry transfers may be involved, it is important to get these calculations as accurate as possible. The choice of the costing methodology to be used is important and ultimately must be practical and acceptable to all parties.

All the countries mentioned in this section have elaborate cost models for USO costing, which require specialised expertise to run them. These models also rely on the industry to provide well-founded data input. In turn, these data often require highly-developed accounting systems, which the companies would not put in place for purely commercial reasons. See end notes [\[2\]](#) from France and [\[3\]](#) from Korea.

Reasons for current low use of administrative USO funding

The difficulty of estimating costs acceptably is one reason why few regulators in Europe have implemented this system, even though the Universal Service Directive allows them to do so if they judge that the cost has become an unfair burden on the designated provider.

Some regulators have estimated that the intangible benefits of USO provision (such as brand recognition, call revenue to low USO clients, positive publicity and marketing), though of uncertain size, are great enough to outweigh the tangible net costs. In any case, under this regime, typically USO providers are incumbents with high market shares of the fixed line market (often well above 80 per cent). Since contributions to shared US funding are proportional to market share, the additional financial support that the US provider would receive would likely be a small proportion of the calculated net loss. This may well be less than the overhead cost of running a shared fund, leaving aside the cost of calculating the amount of compensation that is due.

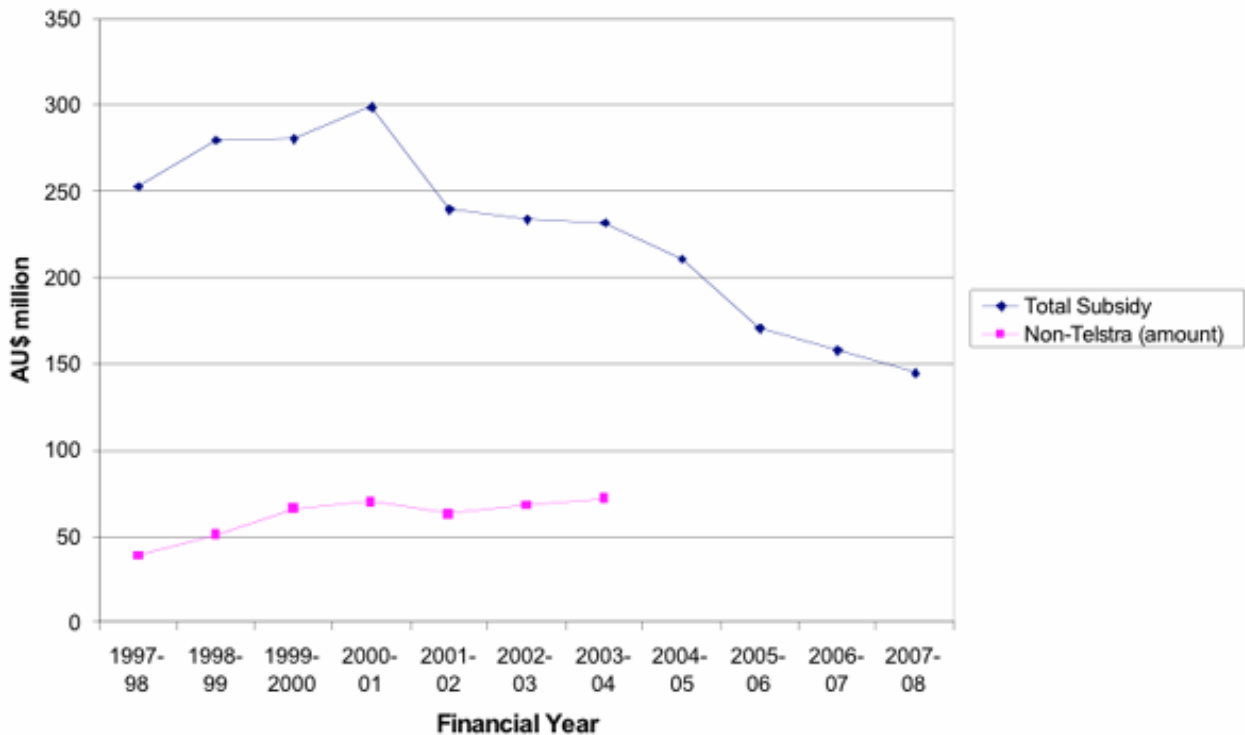
Recently, where mobile operators have secured a much larger share of the total market and reached almost total ubiquity, the question of US is now subject to redefinition. Internet and broadband development also requires the redefinition of US and how to achieve it, requiring likely a competitive allocation. For this and other reasons, the old order of estimating the cost and allocating responsibility for USOs to operators, remains an unfeasible or uninteresting proposition in the most advanced European countries.

The **United States** is currently reviewing its US funding system for high-cost areas. Over the past decade, total high-cost funding has tripled to USD 4 billion per year, and an emergency cap is now likely to be applied to limit further growth. As part of the review, the Federal-State Joint Board is considering introducing auctions, based on the experience of developing countries, but modified to suit the United States' conditions. This will determine the amount of funding that would be available. Many commentators believe that auctions are better than administrative approaches for this purpose [\[4\]](#).

Australia carried out a review in 2004, which led to a decision to base future US funding on estimates rather than on detailed modelling.

The estimates are derived by applying cost element trends, generally an annual reduction of between 5 per cent and 10 per cent, to previously modelled cost totals. The figure below shows how the total subsidies are now being lowered. It also shows the growth in the proportion of the US subsidies coming from outside the main USO provider (Telstra); when last measured, this proportion had risen to 30 per cent. For more detail, see the reference document for the Australian case below.

Figure: Universal service subsidies in Australia



Source: Data from ACMA www.acma.gov.au/WEB/STANDARD/pc=PC_2483 and DCITA

END NOTES

1. [Costing and Financing Universal Service Obligation in a Competitive Telecommunications Environment in The European Union](#), Wissenschaftliches Institut für Kommunikationsdienste (WIK). This and *The future of Universal Service in telecommunications in Europe* (Analysys) are among the consultancy reports for the EU in 1997 and other years.
2. Full documentation of the French approach to universal service, including its costing and funding is provided by the French Regulator, ARCEP at www.arcep.fr/index.php?id=8102.
3. A Korean paper entitled [Estimating the Cost of Universal Service Obligation](#), (Hyunmi Baek, Jaeho Byun and Eunjin Cho, ETRI, South Korea, 2006), using the cases of UK, France, Italy, Spain, Australia and New Zealand as background cases is provided.
4. The following three references provide background to current universal service funding developments in the USA.
 - o [The Future of Universal Service](#) [in the USA]: A Collaboration between the Benton Foundation and the Institute for Information Policy at Penn State University.
 - o [Consultation on the merits of using auctions to determine high-cost Universal Service support](#) (United States Federal-State Joint Board on Universal Service, August 2006), and subsequent statements and consultations.
 - o [Controlling Universal Service Funding and Promoting Competition Through Reverse Auctions](#), James Stegeman, Dr. Steve Parsons, Robert Frieden, and Mike Wilson, 2006.

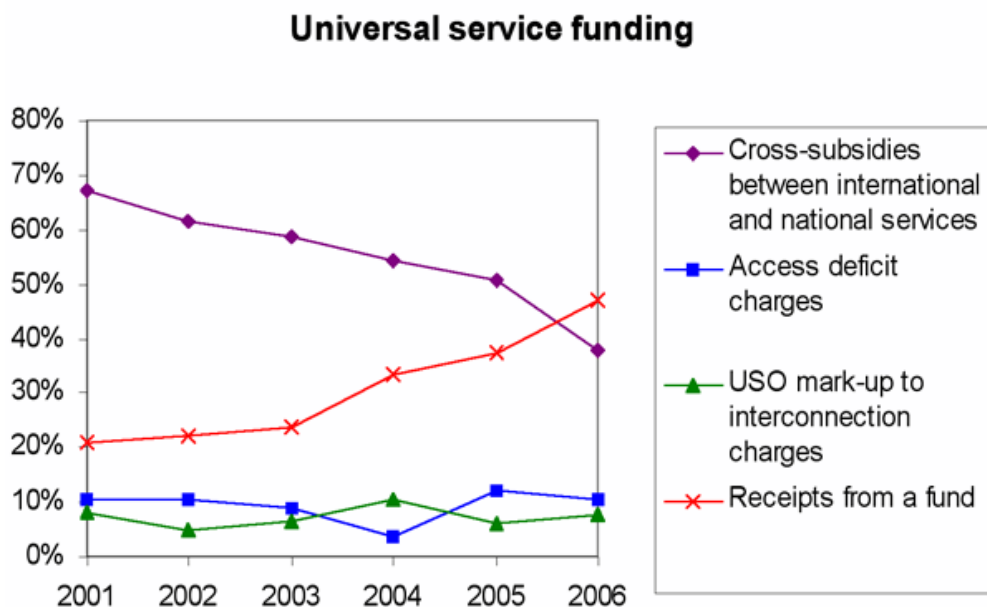
3.1.4 Access Deficit Charges

Another traditional approach to universal service (US) funding has been access deficit charges.

The term access deficit, is defined as the loss made by a telephone company on providing access lines if this is regarded as a stand-alone business. It is the difference between the fully allocated costs of providing access lines and the revenues attributed to providing access lines. Typically, this is calculated as regular line rentals plus installation charges.

The figure shows the small proportion of countries that still use this funding method in the last six years.

Figure: Prevalence of different approaches to universal service funding



Source: Data from ITU World Telecommunications Regulatory Database

Note: Number of surveyed countries vary from year to year.

The need for tariff rebalancing to reduce access deficits

In the past, fixed line monopolies commonly set line rentals well below any reasonable estimate of the relevant costs. They recovered costs primarily through international call charges, which were commonly set well above cost. This charge structure was popular, especially during the mass market phase of network growth, when many middle-income people were subscribing to the phone for the first time. Higher regular charges would have deterred many of these people from signing up, but as new phone users, they were not yet used to making a lot of calls and could live with high call charges.

New competitors usually targeted the high-margin markets of business customers as well as long distance and international calls first; this meant that the incumbent risked large losses unless it rebalanced its tariffs to be more in line with underlying costs. It was therefore necessary to raise line rentals to remove the access deficit while lowering call charges so as to compete with new entrants. Tariff rebalancing of this kind has taken place in most countries at varying speeds. It naturally favours users who make more calls and may lead to higher costs for people who make fewer calls. Slow rebalancing may be seen as necessary for political reasons, where a large number of voters risk ending up with higher bills. An approach favoured in some countries, has been to rebalance faster, while protecting specific small groups of low users with special low rentals.

During rebalancing periods and while access deficits remain, some incumbents have successfully argued that new competitors should contribute towards funding the deficit. The resulting access deficit charges (ADCs) have usually been added to interconnection charges for call origination or termination on the incumbent's network, in recognition of the benefits that the competitors receive from that network.

ADCs are now generally regarded as a poor idea because of the wrong incentives that they create [1]. They are being phased out in most countries where they were previously adopted. For example, in India, TRAI, the regulator, after a consultation, announced in 2007 a cut in the total revenue raised by ADCs from USD 800 million to USD 500 million, and stressed that the ADC regime has always been intended to have a limited life (from 2003 to 2008).

END NOTES

- ITU/OFTA Virtual Training Centre, Universal Service Obligations – lecture notes 2004 includes:
 - [Part 3.2 Hong Kong's approach to Universal Service](#)
 - [Part 4 Costing Universal Service](#)
 - [Access Deficit Charges](#)

3.2 Competing for subsidies from Universal Access and Service Funds

This chapter presents a summary of key aspects of the competitive mechanism used to distribute subsidies from Universal Access and Service Funds (UASF).

UASFs may go under different names of Universal Access Fund, Universal Service Fund or some other designation. Some examples of UASFs are:

- Peru's FITEL (Telecommunications Investment Fund);
- Uganda's RCDF (Rural Communications Development Fund);
- Mongolia's and India's USOF (Universal Service Obligation Fund); and
- Nigeria's USPF (Universal Service Provision Fund).

Almost all such funds have been created in emerging markets and developing countries, in the context of liberalized markets, to provide financial assistance for the following:

- Meeting regional and rural service targets for telephony and Internet services;
- Supporting key users, such as schools and health clinics to access the Internet in regional and rural areas;
- Supporting ICT projects by commercial and development organizations that provide national and local content, services and applications that stimulate Internet take-up and usage; and
- Supporting various activities related to regionally balanced network and service development, such as Internet Exchange Points and regional Internet points of presence (POPs).

[Section 3.2.1](#) describes the first generation of competitive UASFs that emerged in Latin America and which initially focussed on fixed-line service provision. [Section 3.2.2](#) presents the next generation of UASFs that take into account the wireless revolution and needs for Internet and backbone development.

All UASFs use a reverse auction or minimum-subsidy auction (lowest subsidy demanded wins) mechanism. This mechanism, also known as Output-Based Aid (OBA), is defined as a strategy for using explicit performance-based subsidies to support service delivery in cases where the market is not expected to reach, but where policy concerns justify public funding or redistribution. OBA subsidies are provided to support the provision of services, for example, in rural areas where the cost of service provision combined with limited revenue potential might render service provision commercially unviable. A key requirement for OBA is that a one-time smart subsidy results in service provision that is ultimately self-sustaining and commercially viable. [Section 3.2.4](#) discusses UASFs' performance to date.

OBA is now often the preferred method used to distribute one-time subsidies to network service providers in order to meet roll-out targets for voice and Internet services in certain designated remote areas and communities. The methodology is described in detail in [Chapter 6](#), and [Section 3.2.3](#) discusses the advantages of the competitive UASF approach.

3.2.1 First generations of competitive UASFs – fixed line services

The first generation of emerging market UASFs to distribute subsidies based on the principle of competitive tendering, were established in Latin America in the 1990's. The finance was made available under a reverse auction or minimum-subsidy auction (lowest subsidy demanded wins). These competitions were held in 1995, soon after the establishment (in 1994) of Chile's Fondo de Desarrollo de las Telecomunicaciones.

The Chilean case, and ones that followed soon afterwards, were unique in the sense that they were also used as a one-stop mechanism to enable potential new entrants to compete with the incumbent operator for universal access (UA) licenses in areas that were historically, poorly serviced but for which a subsidy was offered. The services provided were primarily fixed network payphones, using wireless access or satellite (VSAT) technologies, and were located in places that were at the time, far from areas expected to be serviced by mobile operators. The Practice Notes [Chile: Fondo de Desarrollo de las Telecomunicaciones](#) and [Peru: Experience of the FITEL programme](#) give insight into the details and lessons learned in the early stages of UASFs.

Five Latin American countries quickly licensed rural operators through such funds. The following table summarizes the funding activities of the first three funds. Several other funds were established (though not all became operational), e.g., Brazil, Argentina, Dominican Republic, Ecuador, Guatemala, Nicaragua and Venezuela, and can be seen in a Regulatel report on UASF funds [\[1\]](#).

Table: Summary of First Generation Latin American UASF Funds							
Country	Name of Fund / Program focus	Source of Finance	Period	Localities served	Maximum subsidy available (USD m.)	Subsidy granted (USD m.)	Subsidy per locality (USD)
Chile	Fondo de Desarrollo de las	Government budget	1995-97	4,504	24.2	10.2	2,256

	Telecomunicaciones						
	Telephony		1998-99	1,412	14.4	9.8	6,919
	Telephony		2000	143	1.9	1.8	12,727
	Telecentres		2002	293	n/a	5.0	17,065
	Internet in rural schools		2004	667	n/a	6.5	12,727
	Fiber backbone		2007	n/a	n/a	2.7	n/a
Peru	Fondo de Inversión en Telecomunicaciones (FITEL)	1% Operator levy	1998-2000	213	5.1	5.1	23,937
	Telephony		1999-2003	2,170	50.0	12.1	5,575
	Telephony		2000-2003	2,520	59.5	30.7	12,163
	Telephony		2001-2004	1,614	12.9	11.4	7,061
	Internet access		2006	68	1.43 (Pilot)	1.43	21,029
	Broadband		2007	1,050	9.0		
	Internet access, public telephony, residential telephony		2007	3,010 Total 2,840 Internet 1,535 Telephony	18.6	15.1	5,104
Colombia	Fondo de Comunicaciones (Compartel)	Operator levy & Government contribution	1999	6,745	70.6	36.0	5,361
	Telephony		2002	3,000	47.0	15.0	5,033
	Internet Community access centres		1999	670		7.0	9,781
	Internet Community access centres		2000	270		8.0	30,242
	Internet Community access centres		2002	500		44.0	88,997
	Broadband and public		2004 -	3,000 Schools		102.7	27,213

	institutions		2005	624 City offices			
				120 Hospitals			

Source: ITU-infoDev ICT Regulation Toolkit – UA Module

As the above table shows, two of the early funds received finance directly from government contributions, while two used a levy on operators (one fund used both government contribution and operator levy). Other early funds, such as Guatemala's, also secured finance from radio spectrum auction fees as well as operator levies.

On average, the amounts of subsidy actually bid and granted for the telephony competitions in the first years, were less than half of the maximum subsidy offered by the funds. This was a benefit that resulted from the competitive mechanism used and the fact that competitions offered a chance for new entrants to secure their first operating licence and radio frequency allocations. However, there was a wide range of experiences, from zero subsidies in some of the early Chilean competitions up to almost 100 per cent of the offered amount in later rounds.

While Internet access can undoubtedly be beneficial for communities, it should also be noted that later Internet access competitions resulted in much higher subsidy investments per community, and although data on offered subsidy amounts is not available, the reduction resulting from the tendering process is believed to be much less. This is also the case in all other subsequent UASF competitions elsewhere primarily due to the lower level of financial sustainability that can be achieved on Internet services. The numbers of initial Internet service users are typically lower than for telephony; a smaller proportion of the market can afford to own personal computers, take-up is slower and Internet services for the poorer parts of the country are generally considered to be a higher investment risk. More work is required in each country to develop sustainable models for public Internet access that entice people to use their services.

END NOTES

1. [New Models for Universal Access in Latin America](#), Regulatel, 2006

3.2.2 Second generation of UASFs in existence today

Following the Latin American experience, a second wave of Universal Access and Service Funds (UASFs) occurred in Asia and Africa. Nepal (1998) and Uganda (2000) pioneered the concept, and several others, including Mongolia, Pakistan, Botswana, Burkina Faso, Malawi, Nigeria and Mozambique, are following in their footsteps. This is often with technical assistance from the World Bank or other international donors. The UASF concept has spread to approximately 46 countries by end of 2007 [1].

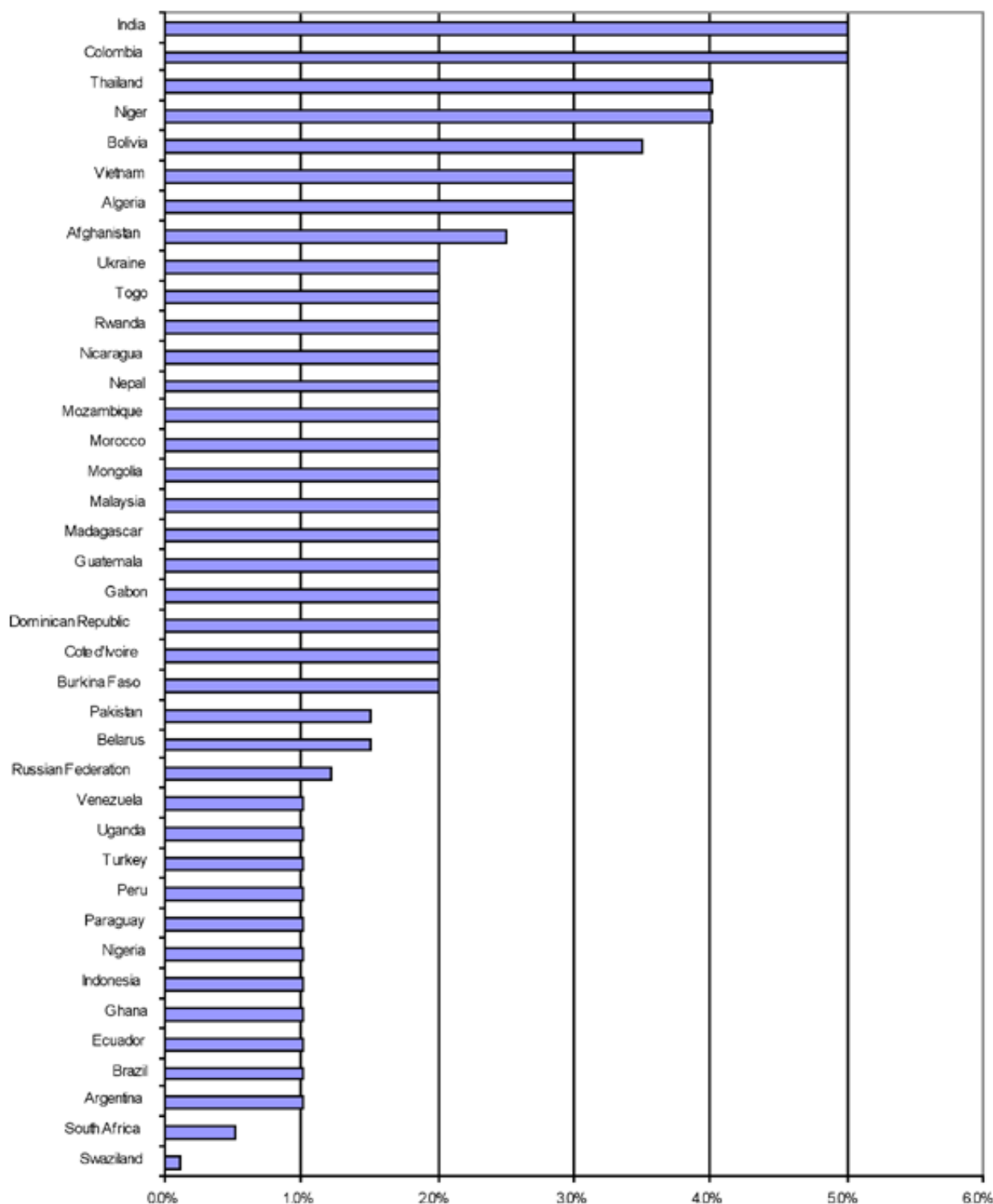
Many of the latest UASF initiatives listed above are following Uganda's lead by holding technology neutral competitions, which are increasingly being won by mobile operators with existing licenses. These UASFs, as well as the early Latin American funds, are also applying their resources to the financing of Internet Points of Presence (POPs) in rural districts, telecentres and cyber cafés, school connectivity, and other ICT initiatives.

Research indicates that at least 39 countries have already set operator levies as the main means of accumulating resources to their fund. These levies range from less than 1 per cent of operator revenues in South Africa, to 5 per cent in India and Colombia, and 6 per cent on certain revenues in Malaysia [2]. See figure below, Existing UASF Operator Levies.

A few funds, notably those in India, Malaysia and the Russian Federation are still distributing the largest share of their resources to fixed line operators and some, notably India and Malaysia, initially used their funds as sources for distribution of access deficit awards to incumbent operators. However, as noted in [Section 3.1.4](#), this practice is now disappearing. The Indian and Malaysian funds appear to be moving their focus onto mobile expansion, while all funds, including the Russian Federation's, fund Internet POPs and ICT development as well.

The Practice Note Uganda's Rural Communications Development Fund showcases this country's best practice approach.

Figure: Existing or planned UASF Operator Levies



Source: ITU-infoDev ICT Regulation Toolkit – UA Module

END NOTES

1. A summary and list of current UASFs and their features can be found at www.inteleconresearch.com/pages/documents/UAFunds2007update.pdf
2. Malaysia's USPF levies six per cent of operator "weighted net revenues", which includes the following services: international calls; call termination service for foreign service providers, freephone service, ISDN, cellular mobile, international roaming, IP telephony, leased lines, other activities subject to an individual or class license. The levy is approximately equal to two per cent of the sector's total gross turnover according to the regulator, MCMC. However it appears to be much higher than this (around the full six per cent) on mobile operator revenues at least.

3.2.3 Advantages of UASFs as compared to other approaches

A Universal Access and Service Fund (UASF) that adheres to best practice can provide a transparent means of allocating subsidies for the achievement of service targets in unviable areas.

Fuelled by a few unfortunate and poor cases, there are some understandable concerns amongst operators over the principle of UASFs. Some operators express a preference for alternatives such as accepting reasonable rural build-out targets in their licence or negotiating specific rural universal access and service (UAS) targets in exchange for relief from UASF levies or taxes, a “pay or play” regime.

However, there are certain potential advantages of UASFs if they are well-run, as described in [Chapter 5](#). These advantages include the following:

Transparency and Fairness

As stated previously, a UASF that adheres to best practice provides a transparent means of allocating subsidies for the achievement of service targets in unviable areas. The alternative of mandating targets in exchange for relief from UASF levies or taxes, runs the risk that it would be difficult to allocate fair targets for different operators in a competitive market. Furthermore, there is unlikely to be equity between fixed and mobile operators, both of whom should be contributing to UAS, unless subsidies are allocated competitively and in a technology neutral manner. The allocation of targets to operators also requires equal prior agreement and collaboration with government by all operators in order to be effective.

Ease and cost of management and emphasis on least-cost solution

A best-practice UASF requires reasonable government targets based on national socio-economic goals and sound knowledge of the demands of the market and of general industry costs and trends. The targets and the maximum allowable subsidies are set independently, using published principles. Even if some operators have different technological or operating approaches from one another, the principle applied is one of technology neutrality, that is, efficiency and least-cost solution to the achievement of the targets.

The alternative process for negotiating fair and equal contributions through a “pay or play” regime in a competitive environment is unlikely to be as simple. The valuation of the contribution of each operator towards UAS would require the regulator seek confidential financial information (revenue, capital and operating expenditure) from each operator, which would not be welcomed. This would be akin to the administratively heavy approach taken in traditional price regulation, or by some very high-cost and patently inefficient previous generation UASFs.

UASFs provide “pay or play” in practice

With a UASF least subsidy tender, no operator is forced to participate in the competition. On the output side, it is entirely voluntary, thus operators who are not interested in serving rural areas or providing public access are free to opt out, though they do have to contribute to the fund. The UASF can be a way of requiring that the industry at large finance the achievement of UAS, while only operators interested in expanding to rural areas will tender for the subsidies. The successful operators will, in fact, have a portion of the funds they contributed and maybe more, returned to them.

UASFs can bring finance into the sector & reduce the cost to operators

Universal Access and Service Funds (UASFs) present a mechanism for government, or donors such as the World Bank, to contribute financially to universal access and service (UAS) in a liberalized market, without getting directly involved in less-efficient forms of project ownership or management, as in the monopoly era. This has resulted in a considerable amount of seed finance being contributed before the build-up of equity through operator contributions in some smaller markets. Examples of some USAF mechanisms are as follows:

- In the first of such UASFs (Chile), the government contributed the whole amount and no levy was made on operators;
- In Uganda, a World Bank contribution of over USD 7 million resulted in a much more rapid roll-out of the Rural Communications Development Fund (RCDF) programme than would otherwise have been possible. As a result, the leading GSM operator received subsidies amounting to more than its contribution to date. By 2007/2008, a similar contribution in Mongolia will result in similar benefits to the country, to operators and, of course, to the rural communities served; and
- In Botswana, the regulator pledged part of its own finance collected from regulatory fees to a future UASF and the government is considering providing the finance for the first competitive UAS project.

The public interest is explicitly served

The process of good governance typically requires an explicit determination of objectives and targets, a process of consultation, buy-in by all stakeholders, and satisfaction by consumer representatives that various power bases are balanced for the public good. This has been achieved reasonably well in the case of the best-practice UASFs currently in operation that held public tenders. It would be difficult to achieve the same level of confidence through a trade-off negotiation with operators, unless the UASF administration could clearly demonstrate the basis of the balance of interests and fairness achieved, with a high degree of transparency. This would, as previously stated, run the risk of incurring a heavier and more intrusive administrative bureaucracy.

The concept of virtual funds exists since several years, however no country has implemented a virtual UAS fund. The advantage seen in virtual funds is mainly that the actual money of operator levies does not need to move into - and then later out of - a fund to the recipient,

eliminating the need for actual fund management. A virtual fund would simply be an accounting system that records each operators' annual UAS levy. Against the levy, operators could set the costs of special UAS projects. But this still requires some independent cost accounting to ensure operators allocate their costs fairly and comparably. If a virtual fund is used with a competitive bidding mechanism, it could be challenging as the likely scenario could arise that one operator who lost in a competitive bid has to pay part of their UAS operator levy to the winning bidder.

3.2.4 Performance of funds to date

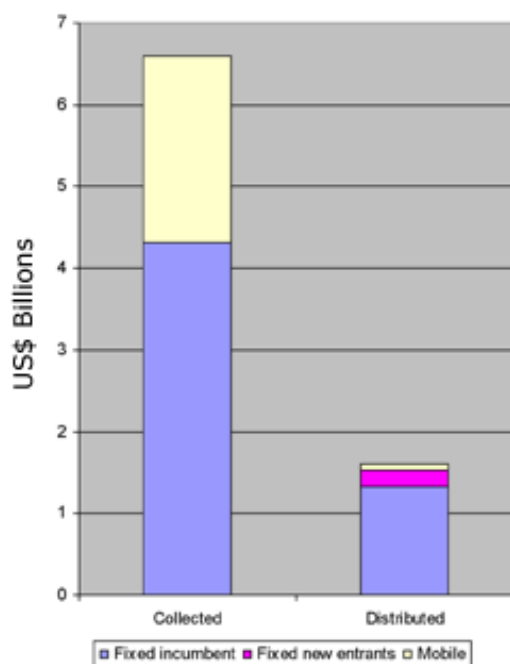
Best practice and a review of the performance of the largest Universal Access and Service Funds (UASFs) would indicate that the amount of levy should be calculated to meet only realistic and achievable targets and to be within the capacity of the fund's administrative apparatus to manage and monitor the distributions.

A total of 15 funds in developing markets that are operational, had collected a total of approximately USD 6.2 billion from operators, beginning in the late 1990's (but mostly since 2001 and 2002) [1].

78 per cent of the total collections (USD 4.8 billion) came from two countries (India and Brazil), 9 per cent (USD 548 million) from Malaysia, and 2 per cent (USD 111 million) from Peru. The remaining 12 countries totalled less than 12 per cent (USD 725 million).

The 15 funds have also received a relatively small additional contribution of USD 62.8 million from government and international donor sources. However, the latter came primarily from just three countries [2], thus the majority of resources have been contributed by industry.

Figure: Performance of 15 Developing Country UASFs



By 2006, these 15 funds redistributed approximately USD 1.62 billion to the sector for universal access and service (UAS) projects; this represents just 26 per cent of the total collected. This was distributed in the following way:

- 81.0 per cent to incumbent fixed line operators;
- 11.7 per cent to new entrant fixed line operators bidding specifically for UA service;
- 4.6 per cent to mobile operators; and
- 2.7 per cent for ICT projects of various kinds.

To date, the impact of these UASFs on UAS and progress towards it has been very mixed. One criticism levelled at USAFs is that they have contributed little to mobile expansion or penetration at the margins of those operators' commercial viability, even though mobile is typically the most effective means of reaching rural areas. Cases which stand out against this trend are Colombia, Mongolia, Uganda, and to a limited extent, Malaysia.

Some funds experienced legal limitations to disburse funds, as their mandate had been defined too narrow, e.g., allowing funding only for

pilot projects, etc.

The primary characteristics, best practices, strategic planning and pitfalls of UASFs, in particular, the means of balancing resources with disbursements, and institutional concerns, are described in detail in [Chapter 5](#) to [Chapter 7](#) of this UAS Module.

END NOTES

1. Bolivia, Brazil, Chile, Colombia, Dominican Republic, Guatemala, India, Indonesia, Malaysia, Nicaragua, Pakistan, Peru, South Africa, Uganda, Vietnam, see GSMA report, Universal Access - How mobile can deliver coverage and services to all, 2006
2. Chile (Government), Colombia (Government), Uganda (World Bank) are the prime examples up to 2006 of where UAF contributions other than operator levies have been significant.

3.3 Non-central government actors in universal access and service

This section considers the role of private sector, non-government and local community (or municipal actors) in universal access and service (UAS). In most cases, these participants play a developmental role and, as such, represent bottom-up rather than top-down policy driven initiatives. However, non-government and local community participants are considered here because, to greater or lesser degrees, they have become significant contributors to the objective of reaching underserved populations and of bringing communications and improved livelihoods to the poorer segments of society.

It is not practical to attempt to include all possible non-government linkages to UAS because of the risk of creating confusion and reducing the impact of UAS policy, or indeed the responsibility of policy makers and regulators to establish and lead UAS policy. However, various trends are clearly significant and should not be ignored. These are:

- Micro-finance and private entrepreneur led village phone initiatives, are discussed in [Section 3.3.1](#);
- Community and municipal broadband networks, presented in [Section 3.3.2](#); and
- Internet public access, telecentres, and cyber cafés experiences summarized in [Section 3.3.3](#).

3.3.1 Village Phone Programs

One approach to universal access (UA), which springs from the user side of the network—even though the first international case and several current initiatives involve leading mobile operators—is the village phone concept. This has emerged in several forms around the world, sometimes organized by a Micro-Finance Institution (MFI), sometimes by a private enterprise, or sometimes by the operator with financial partners.

The village phone concept began with the launch of the village phone programme in rural Bangladesh in 1997 as an initiative of the Grameen Bank. The Grameen Bank provides impoverished village women with financial support to develop sustainable income generating activities. In 2006, Muhammad Yunus, the founder of the bank, and the Grameen Bank itself, were jointly awarded the Nobel Peace Prize "for their efforts to create economic and social development from below."

Women clients of the Grameen Bank who show the initiative to become local Village Phone Operators (VPOs), receive training and are loaned funds to purchase a mobile phone set-up (phone with special in-built pricing software) suitable for rural areas, as well as airtime credits. Through the network of VPOs, vending affordable airtime denominations and facilitating individual calls, residents enjoy better access to communication services.

The success of the programme at generating sustainable business and social empowerment opportunities for women, and high performance in the recovery of loan disbursements, led to the replication (with variations) of Grameen's initial Bangladesh model, in the African countries of Nigeria, Uganda and Rwanda.

Essential features

At the core of a generic village phone programme is a viable business model for local entrepreneurs (women and increasingly men) to provide telecommunications services to their community. The entrepreneurs are offered a telephone operator business kit consisting of a mobile phone, external antenna (in the African cases), business management materials, a marketing poster, and usually some introductory training via the telecommunications service provider alone or in partnership with supporting organizations, which include microfinance entities, banks and non-government organizations (NGOs).

The entrepreneurs then buy discounted pre-paid airtime credits for resale at a profit and thereby offer an affordable public mobile phone service to their communities. They can typically also sell airtime top-ups for other mobile network private subscribers. Earnings from the business are then used to pay off the initial investment (typically in less than a year) and provide long term income for the entrepreneur.

For local residents, VPOs provide affordable access to the mobile communication services, where the cost of mobile handsets, hardware and account subscriptions have otherwise limited people's ability to use the existing telecommunications services. By establishing

widespread communication access in impoverished areas, the village phone approach has been shown to empower the poor by enabling them to improve their livelihoods and generate income through reducing the opportunity cost of communication. The participants experience enhanced networking opportunities and access to knowledge, which is increasingly available through the text transmission services.

Various benefits of the village phone model

As pointed out by the World Resources Institute in their NextBillion initiative to support widespread social entrepreneur opportunities to the poor, “Low-income populations have clearly benefited from access to mobile phones, which ease access to jobs, to medical care, to market prices, to family members working away from home and the remittances they can send, and, increasingly, to financial services.” [1].

The village phone model facilitates delivery of core services and market expansion of the organizations involved, and this benefiting also governments, regulators, telecommunications companies, micro-finance institutions (MFIs) and development organizations. A village phone approach allows telecommunications providers to increase sales of airtime to a greater number of new users, as well as widely extending their service infrastructure to all clients (e.g., VPOs selling airtime, facilitating calls, product information, etc.) without the prohibitive costs of formal staffed facilities.

Operators active in village phone-type programmes also find that further market share can be leveraged through branding of the service via an expanded presence of dispersed VPOs [3]. MFIs can also expand the reach of their services and empower clients with increased access to important communication resources and information that can be used to improve productivity and opportunities. For national governments with responsibilities for telecommunication infrastructure and regulation, a village phone approach can assist in meeting national universal access (UA) goals for optimal community coverage.

Key roles and alternative models

Key organizational roles and responsibilities of this model include the following:

- **Finance/Development Organization** – Responsible for providing and managing financing, capacity development for potential client operators and expanding reach of VPO model as viable livelihood strategy. Traditionally, microfinance organizations such as Grameen Bank, are involved in this role;
- **Telecommunications Provider** – In charge of mobile network infrastructure, responsible for being compliant with regulatory and licensing issues, and supply of airtime credits for programme use. In Bangladesh, this role is carried out by Grameen Phone Company;
- **VP Company** – A distinct company usually created by the telecommunications provider to manage the village phone program, finances, partner liaison and expansion of the program. An example of a VP company is Grameen Telecom; and
- **VP Operator (VPO)** – An individual who participates in a village phone program and is established as a communication services business for the community where he/she lives. In Bangladesh, this refers to women clients of the Grameen Bank who are established in a business selling mobile phone services – call by call.

As demonstrated in the case of the village phone implementation in Uganda spearheaded by the mobile operator MTN, an alternative operational model has resulted in implementation successes beyond planned expectations; significant expansion and adoption of VPO businesses are occurring without formal intervention and loans from microfinance organizations. Details regarding the village phone implementation approach utilized in Uganda and implications for alternative village phone models are included in the Reference document *Review of Replicating Village Phone from Uganda and Bangladesh*.

Regulatory response to Village Phone

The integration of a village phone approach in efforts to realize national universal access and service (UAS) goals requires complementary regulatory and operational structures to facilitate integration of policy with the dynamics of the competitive telecommunications market and required standards for quality of services.

For example, appropriate village phone tariff regimes should price services within reach of the intended beneficiaries while not undermining other telecommunications service providers' market. In general, regulators can be confident that the players involved can make use of existing competitive tariffs without intervention beyond that which may be required to monitor competition and ensure a level playing field and minimal dominance by the strongest operator(s).

These are the tangible actions that policy and regulatory bodies can facilitate for village phone programs to thrive within, and complement, UAS programmes:

- Policy and regulatory bodies can establish specific funding mechanisms or categories for village phone initiatives (for example in collaboration with financial institutions or under the universal access and service fund (UASF) programme) that supports any one or more of the following:
 - a. assessment of village phone activities;
 - b. training and capacity development;
 - c. programme evaluation;
 - d. start up financing options for VPOs; and
 - e. working capital for village phone operators; and
- Regulatory bodies should streamline tariff and regulatory requirements appropriate to the scale of VPO service provision. Typically, VPOs make use of bulk discount tariffs available from the telecommunications operator, which enable them to retail their service at a profit while offering the end users an attractive price for calls compared to the price of calls under private subscription.

The future of Village Phone programmes

The village phone program in Bangladesh is experiencing a decline in profitability due to a combination of two factors:

- Increased numbers of VPOs: starting with 32 VPOs in 1997, the number reached almost 280,000 in 2006; this increased competition among VPOs is squeezing the profit margins to a minimum; and
- Increased affordability of mobile phones for individuals, leading to a decline of demand for public access village phones.

Bangladesh's village programme might become a victim of its own success and the success of the market. It and other programmes will only remain relevant for the future if they are able to integrate value added services into their offering, which could include, for example, mobile banking, mobile data, Internet and broadband services.

END NOTES

1. Allen Hammond et al. *The Next 4 Billion* in Innovations - Spring/Summer 2007, World Resources Institute.
2. Numerous rural demand studies and cost-benefit analyses have demonstrated that rural residents either already spend or are willing to spend and see the need to spend between 5-10 per cent of their household income on the phone. These include studies recently carried out for the regulators in Nigeria, Burkina Faso, Mozambique and Mongolia as part of UA policy and programme development activities. See for example the NCC Demand study, on their web-page
3. The VP programmes in Nigeria, Uganda and Rwanda are clearly being used to promote the brand name of MTN in all villages where a VP operator is established and was part of the feasibility justification for those local MTN operators.

3.3.2 Community and municipal broadband networks

This section introduces and summarises community involvement in universal access and service (UAS) and provides an introduction to community networking and pre-conditions for success.

There has always been overlap and interaction between UAS initiatives and ICT for development (ICT4D) initiatives. UAS initiatives have been primarily concerned with access to telecommunication infrastructure and services whereas ICT4D have focussed on the use of computers and the Internet to support development. The focus on community involvement is typically more prominent with ICT and broadband initiatives, also in developing countries.

Reasons for community involvement in UAS projects

Communities have a role to play in UAS for the following reasons:

- Some available low-cost communications technologies can work on a neighbourhood scale and are not too technically demanding, e.g. WiFi and VoIP, with free and open source software (FOSS);
- There is a recognition of the critical role local leaders have in tailoring ICT facilities and services to local needs as well as the importance of community ownership of ICT programmes, which is vital in working towards sustainability;
- Communities have a growing awareness that poverty is a complex phenomenon, stemming from a lack of power as much as from a lack of money, and that grass-roots initiatives, which build local competence and confidence, contribute significantly to poverty relief; and
- There is a rising popularity of development of multi-stakeholder partnerships, in which the public sector, the private sector and other interested parties work together, each contributing finance, skills or other resources. For good results, end-user communities should usually be development partners.

Community-based ICT supply is a recent trend, however there are a few established examples to turn to in order to assess success factors. Often, these examples are small-scale initiatives. Some are referenced in the Box Community networks in developing countries.

Organizing for community involvement to spread access to ICTs

Different types of organizations play a role in community ICT involvement, often in partnership with one another. They include the following:

- Formal co-operative societies have been in existence for rural telecommunications provision in the USA for a long time. Experience in the developing world has shown this to be largely impractical for voice communications at least, as they cannot be heavily subsidised as in the USA, which is also a high-income country. However, other forms of co-operatives or unions, such as in the agricultural producers' co-operatives, might become important sponsors of ICT and broadband networks. Several examples already exist, including the Peru co-operative mentioned below;
- Local governments such as municipalities (councils of small towns) with their own sources of finance;
- Schools and colleges, which may in turn be publicly or privately owned and operated and which are potential sponsors of telecentres and content initiatives;
- Private entrepreneurs and small businesses, sometimes with characteristics of social enterprise (with explicit objectives to

contribute to local development as well as to make a profit);

- NGOs (often national or even international, rather than local, or in receipt of international funding). The Jhai Foundation in Cambodia is a good example of an organization with broad objectives that has attracted international support and developed a robust, cheap PC and communication system; and
- Community based organizations (CBOs) made up of groups of local residents who come together, often under the aegis of an NGO, for regular contributions to a savings account, mutual support and development efforts.

The Regulatel study of UAS programmes in Latin America identified ten specific initiatives of special interest or examples of good practice. Of these, at least seven include important elements of community participation. These include:

- A co-operative in the Chancay-Huaral valley, Peru, partly financed by users and run entirely by locals, which has an emphasis on training young people to operate and administer the network;
- Ruralfone, a small GSM enterprise in Brazil, staffed with locals and privately yet profitably run on low-cost principles which are similar to those advocated for Tanzania in Scanbi-Invest's report Profitable Universal Access Providers; and
- Non-commercial telecentres such as the LINCOS of Costa Rica and the Dominican Republic, generally run with financial support from governments (sometimes through Universal Service Funds).

Community networks in developing countries

The following provide some examples of active, successful community initiatives that influence or coordinate UA policy:

- Mahavilachchiya, Sri Lanka <http://www.mahavilachchiya.net> – a wireless mesh network linking home computers to the Internet. Initiated by a local teacher and now supported by ICTA, the official organisation for e-Sri Lanka;
- Myagdi District, Nepal <http://www.nepalwireless.net> – a wireless network linking scattered villages in a mountainous region. Led by Mahabir Pun, a teacher, who attracted international volunteers to help him;
- Air Jaldi, Uttaranchal, North India <http://drupal.airjaldi.com> – a collaboration between local NGOs and the University of California at Berkeley, providing fast wireless mesh connectivity to over 2,000 computers spread throughout several different institutions;
- Akwapim, Ghana <http://www.wirelessghana.com/node/3> – ten nodes over a 20 km range, offering connectivity to schools, businesses, and community activity centres throughout six towns in the mountainous Akwapim North district; and
- Agrarian information system in Chancay-Huaral valley, Peru <http://www.huaral.org/> – this links 14 telecentres; an indigenous information system in Chuquisaca, Bolivia, serving a population of 1,500; described in Annex 3 of Regulatel report at: <http://www.regulatel.org/miembros/ppiaf2.htm>

Pre-conditions for success of community networks

Although such networks now have growing chances of success, the community network solution can apply only to some developing world communities. Pre-conditions for success include the following:

- A minimum critical size – for example, a typical community network based on WiFi technology requires a population of around 15,000 with annual income per person of USD 500 to support itself [1]. As technology costs reduce further, this critical population will also shrink, still, many communities will be too small to support successful community networks;
- Communal consciousness or some level of organization enabling the population to function as a community, express its shared needs, and act in its own interests is necessary for community networks to succeed. This might be more likely, for example, in a self-contained rural settlement than in a peri-urban, or fringe settlement of the same population size, where there are people who have migrated from different parts of the country, who work in a nearby city and who may have less social cohesion than a rural village;
- Local leadership and, preferably, a core of committed people with a certain level of education and technical skills;
- Access to external technical and managerial support, especially if these skills are lacking locally; and
- A supportive political and regulatory environment that promotes community networks can help enormously.

Plainly, the above pre-conditions for community network success are much more likely to be met in more prosperous societies, particularly where household income is much higher; the minimum critical size of community can then correspondingly be much smaller. Currently, unserved or grossly underserved poor communities do have an advantage in that the community network can capture most, if not all, telecommunications revenues, rather than sharing them with existing telecommunications operators and other competitors. However, community networking is growing faster in developed countries, bringing broadband connectivity for the first time to many rural and remote areas and often providing free publicly accessible broadband in urban areas (e.g. community hotspots, municipality broadband networks, etc.).

The desire for universal broadband access in developed countries (that are already close to universal telephone and narrowband Internet access) is leading the push for community initiatives.

END NOTES

1. *Community-based Networks and Innovative Technologies: new models to serve and empower the poor*, UNDP (Sean O Siochru, Bruce Girard), 2005

3.3.3 Public and community Internet access, telecentres and cybercafés

Community telecentres started in Scandinavia as “telecottages” in the 1980s and have since spread to many other developed and developing countries. A telecentre is a place where the public can access and use telecommunications. The term can mean anything from a single public phone shop to a fully equipped multimedia suite with dozens of individual workstations, office equipment and services, meeting rooms and related facilities. Although some exceptions exist, the term most commonly refers to a facility where the public can access the Internet and ICT services, as opposed to purely voice telephony services.

While phone shops are invariably a potential component of universal access and service (UAS) telephony projects, ICT telecentres have also become part of UAS programmes and finance. Telecentres can be run commercially (often very successfully), primarily as cyber cafés with some non-commercial features, or they can be run primarily for community benefit as non-profit or locally subsidized facilities. In the latter case they are usually known as community telecentres or multi-purpose community telecentres. Telecentres may also be known by many other names, such as nanasala in Sri Lanka, community e-centre in Malaysia, and so on.

This section provides an overview, through the experience and perspectives of several telecentre programmes, and commences with early cases proceeding to current knowledge.

Lessons of the first telecentres in developing countries

Three common lessons from early telecentre experience included problems with:

1. Gaining sufficient high speed, quality and timely access to a communications circuit that would allow users to have an Internet experience that is relevant, worthwhile and which will engender ongoing interest in ICT and capacity development. This challenge led the planners of Uganda’s rural communications development programme to focus on providing high speed Internet Points of Presence in district centres, where demand is most likely to exist and key users might emerge, ahead of focusing on telecentres. In several places, commercial cyber cafés emerged once Internet access was made available. These businesses could provide the experience as well as technical resources to support community initiatives or assist vanguard institutions such as schools, hospitals, community broadcasters and government offices. The practice of focusing first on Internet POPs has now become standard practice in many of the new generation of Universal Access and Service Funds (UASF) described in [Section 3.2.2](#);
2. A fundamental lack in the quality of business management and technical skills that are required to identify and understand user demand, run a telecentre facility successfully, keep records, provide service and support users. Development practitioners and policy makers now focus on this problem, along with developmental expertise, to ensure an optimal and complementary response to the availability of both network access and UAS funding; and
3. Commercially run telecentres, as well as NGO or donor financed telecentres, struggle with sustainability. Often the cost of maintaining, upgrading and replacing equipment is underestimated, while service revenues are over-estimated. ICT services generally have a slower take-up rate than voice services, especially in rural areas and developing countries where more uptake barriers exist, such as general literacy and computer literacy.

Perspectives on how to approach telecentre development

These are issues to consider when developing a telecentre:

1. Telecentre planning needs to take into consideration a range of possible funding options and models that fulfil sponsors’ objectives [2]; and

Diverse telecentre funding models

- Demand-driven models — Many early community telecentres started with over-investment in equipment, services and applications without proven demand; smaller telecentres or cyber cafés—commercial or community and non-profit based—expand and grow from modest beginnings if and when demand and affordability allow this. Good Internet access is essential.
- Commercial models — Telecentres planned and run on a commercial basis and managed by local entrepreneurs, are capable of developing business plans and management systems. Commercial operators can establish a network of telecentres through the involvement of national telecommunication firms, Internet players or other technically competent organizations.
- UASF funding for telecentres — The prime funding policy instrument can provide smart subsidies (ideally limited to the range USD 15-25,000 on a matching basis) for small, manageable commercial telecentres in rural areas to help offset large start-up costs, or may be used to subsidize telecentres on an ongoing basis in areas that are beyond commercial viability.
- Other funding options for telecentres — Small loans and seed finance are two examples of options that international aid agencies and organizations can offer. Small loans (e.g., up to USD 15,000) can be made to local entrepreneurs or phone shop operators

wishing to start a telecentre business and purchase computer equipment and other advanced ICT equipment to establish small privately owned and operated telecentres, and seed finance can be provided on a matching basis for qualifying national or regional private sector players wishing to establish or extend a larger-scale telecentre operation into rural areas.

- Contracting telecentre facilities — International development NGOs and institutions, and local governments, can be major users of telecentre facilities and services if they involve the telecentre in, for example, educational outreach, rural development, public governance or health programmes. Rather than attempting to implement these facilities themselves, contracting a commercial or semi-commercial telecentre to provide certain public services brings the agencies cost-efficiency gains, while at the same time providing these businesses with additional revenue.
- Multi-sector support: International development NGOs or agencies, that focus on any sector's development which uses ICT, can align themselves with a national telecentre initiative and can sponsor services and applications that are not self-supporting, though developmentally useful, while the profitable services are commercially run and managed.

Source: Commonwealth of Learning, Chapter 1 in Telecentres: case studies and key issues, 2001.

2. Identify success factors and best-case characteristics of telecentres. The UNESCAP Guidebook, based on the Malaysian experience, provides an example in the box below.

Success factors for community e-centres (CeCs) in Malaysia

- Focus on people, organization, content, and processes rather than on the technologies;
- Research the actual needs and socio-economic goals of the community;
- Provide ICTs and services via the CeCs which are relevant to community needs;
- Find local champions who can motivate and mobilize the community;
- Community participates capitalizing on local strengths and resources in the development (planning, implementation and operation, evaluation, monitoring) of the CeCs;
- Sound business plans and sustainability models ensure CeCs' continuing existence and growth;
- On-going monitoring and evaluation of CeCs' performance;
- Foster and develop smart partnerships (government, industry, NGOs, and community) for strategizing and translating CeCs' goals into action; and
- Continue to train and educate the CeCs' personnel and community.

Source: *Guidebook on Developing Community E-Centres in Rural Areas: Based on the Malaysian experience*, UNESCAP, 2006

Lessons from many years of telecentre experience, are condensed into key characteristic of "Telecenter 2.0" (Second Generation, 2.0):

Characteristics of mature telecentres (Telecenter 2.0)

Policy

Government policy recognizes the role of ICTs in poverty reduction. Telecenter 2.0 is an instrument for achieving national e-inclusion, which goes beyond mere access to technology and addresses the underlying socio-economic disparities of the poor and under-served.

Regulations

Telecentre 2.0 operates in a deregulated telecommunications environment, in which increased competition is encouraged and licensing requirements are relaxed. This will significantly contribute to successful telecentres. A Universal Access and Service Fund (UASF) assists with infrastructure development in poor rural areas considered un-commercial.

Partnerships

Telecentre 2.0 is formed and/or operates within a national alliance. Although there is no single dominant model of Telecenter 2.0 ownership or operation, all implementations fall under a form of multi-stakeholder participation that includes government, NGOs, civil society organizations, the business sector, academia and practitioners. Each partner in the national alliance, in conjunction with the communities that they work with, evolves its own model.

Funding

Telecentre 2.0 is funded and sustained by a mix of investment, subsidy and its own revenue. Government pays for services that benefit the poor, just as it does with services that benefit all citizens regardless of income, such as libraries, education, transportation and health care. At the same time, local investors are mobilized by the opportunity to make profits. Telecenter 2.0 is not donor funded.

Content and Services

Telecentre 2.0 provides/handles Internet content that is relevant to local needs and which promotes local development. Content and services are produced largely within the partnership arrangements of the national alliance.

Staff

Telecentre 2.0 is staffed by local people with skills in community development. It is probable that the staff includes women. Local staff members are able to organize community discussions and focus groups that reveal the informational needs of the community, which the telecentre can provide. Local staff is able to promote the use of the telecentre for business development and other schemes that benefit the community.

Evaluation

Telecentre 2.0 programmes are evaluated; the results indicate the extent to which local development has been stimulated, and in which women, the poor and other under-served groups are well represented. The results of the evaluation are used to advise further development of the programme of which it is a part.

Networked

Telecentre 2.0 belongs to a national and/or international network of telecentres, which facilitates the sharing of experiences and resources. Personnel meet regularly at district, regional and/or national gatherings in which they learn from each other and resolve problems of common interest.

Source: adapted from APDIP e-note 14, Roger Harris 2007.

Details on specific telecentre initiatives in developed countries are summarized in the Practice Notes *The Western Australian telecentre network* and *Canada's Community Access Programme*. For experiences in developing countries the Practice Notes *Colombia's Compartel programme* and *FITEL's telecentre experience in Peru* discuss two examples that involve Universal Access and Service Funds (UASFs).

3.4 Open access, shared access and ICT backbones

This section outlines the trends and options for improving access to, and construction of, broadband backbone networks as well as models for infrastructure sharing. These options include:

- Opening networks of monopoly or dominant operators to competition and wholesale service provision, as discussed in [Section 3.4.1](#). Non-discriminatory access to incumbent networks in developing countries is vital. The enforcement of open access is a pre-requisite to further progress in network development and universal access (UA) even if requiring incumbent operators provide open access, or any access to wholesale customers, might deter some commercial investors during a privatization process. The extent to which investor discouragement would happen on a more general basis, is central to discussions in the EU about Next Generation Networks (NGNs) [\[1\]](#);
- How Universal Access and Service Funds (UASFs) can enhance backbone network development, is described in [Section 3.4.2](#). Until recently, backbone networks have not necessarily been considered part of a UA programme, but with the increased importance of broadband, the funding for backbone enhancement is now increasingly, and quite reasonably, expected to come from UASF resources.
- Emerging alternative network options, specially constituted network operators and network operators in a consortium, which are discussed in [Section 3.4.3](#), [Section 3.4.4](#) and [Section 3.4.5](#); and
- Infrastructure sharing aims to extend networks to areas where service provision is commercially viable if several operators share the costs of infrastructure such as towers, is discussed in [Section 3.4.6](#).

These options support UA and remove barriers to ICT development or market efficiency (See also [Section 1.3.3](#)); [Section 3.4.7](#) presents the funding options available for backbone initiatives.

END NOTES

1. See [Regulatory Principles of NGA](#) (ERG, May 2007).

3.4.1 Incumbent network access

One way of fostering competition is to ensure that new entrants can use the infrastructure of existing operators. These new entrants, such as ISPs and other network operators, then become wholesale customers of the existing operators. The new entrants and the existing operators might compete with one another for the same retail customers, setting up a scenario where existing operators might seek to discriminate against the new entrants and act in favour of their own retail arms. The regulator needs to prevent discrimination to make service-based competition effective. This regulatory intervention is often most critical to ISPs that may feel that the incumbent is both overcharging for the national backbone and acting in an anti-competitive manner in its retail pricing for Internet customers.

Incumbent operators may lack interest in serving wholesale customers on a non-discriminatory basis and may point to the investment made in network facilities and the economies of scale and scope due to their vertically integrated operations. Incumbents may even have genuine technical difficulties in avoiding discrimination because of their vertically integrated operations.

Under good regulatory practice, operators should be prevented from discriminating against wholesale customers that are also their competitors, especially in cases where incumbents have monopoly or dominant powers or have used public funds in constructing their networks. These are the ways a regulator can ensure fair and non-discriminatory functioning of the market:

1. **Interconnection and price regulation** – The regulator can enforce wholesale access and regulate the prices operators are able to charge (e.g., for E1 and sub-E1 transmission bandwidths, or for local loop facilities). Ideally the prices are based on costs (cost plus). However, even defining how costs should be calculated (and calculating them), e.g. using bottom-up Long Run Incremental Cost (LRIC) models, requires time and effort. Until the operator is able to demonstrate its incremental costs in an acceptable manner, the regulator must resort to other approaches. The regulator sometimes imposes international benchmarks, based on interpretation of best practice and similar country cases, or requires wholesale prices to be based on retail prices (retail price minus).
2. **Accounting separation** – This can be used to make the operator with significant market power (SMP) identify costs and revenue streams for unbundled products and services and sell them on a non-discriminatory basis. It has been practised for many years in conjunction with interconnection and price regulation;
3. **Functional or operational separation** – This can be used to make the wholesale arm of the operator treat the retail arm of the operator just like any other wholesale customer. The retail arm must use the same systems and processes as other wholesale customers, and the retail arm cannot receive information from the wholesale arm about other wholesale customers. This can be difficult to achieve because the operator has typically integrated systems and processes constructed over many years. Many issues need to be considered such as the impact on investment incentives, before functional or operational separation can be required and it is therefore considered a last resort [1]. Nonetheless, because separation of accounts and interconnection and price regulation are not always sufficient, functional separation is gaining some international interest. The UK has adopted functional separation in the access networks for local loop unbundling, and backbone transmission, and Sweden, Italy and Poland are likely to follow. (It is sometimes also called structural separation, but here this term is used for an even more interventionist way of preventing discrimination); and
4. **Structural separation** – This involves turning the operator's wholesale and retail arms (or, sometimes, the network and service parts of the operator) into separate, independent companies. This scenario presents all the difficulties of functional separation as well as the problems and costs that arise when a large company demerges. Structural separation also tends to be associated with the view that the wholesale company should have a monopoly. When this happens, the wholesale company may well behave in the unresponsive manner characteristic of many incumbents. Both Mongolia and New Zealand (by the incumbent as a preferred alternative to functional separation) have proposed structural separation. The Practice Note *Structural separation explained and applied*

provides a useful background to recent trends towards separation in OECD countries, covering its benefits, risks and limits.

Where network operators are less powerful or privileged in relation to their wholesale customers, regulation will be less necessary.

In principle, if wholesale customers can take their business to several, equally strong, competitive network operators, wholesale customers are less likely to suffer from discrimination, and the regulator is better able to monitor the market. The regulator then needs to intervene only under exceptional circumstances or in cases where one or more operators appear to be abusing a dominant position.

END NOTES

1. See *Network separation and investment incentives in telecommunications*, August 2007, Martin Cave and Chris Doyle, Warwick Business School, University of Warwick, UK

3.4.2 Backbone network enhancement

A challenge that must be faced when considering backbone network enhancement, is that there is more than one motivation driving the demand and investment in main transmission facilities; these are basically network reliability/redundancy and capacity. Policy makers and regulators cannot act in isolation from these or imagine that even an expensive new investment in a third party network operator would be fully utilised or beneficial unless the present and future needs and economic motivations of the existing operators are fully understood and taken into account.

Links that are closer to the centre of a network carry more traffic. Failure of these links is therefore more serious than failures further out from the centre. The links nearest the centre are therefore typically made redundant, so that if one link fails then an alternative route between its end points can be used instead.

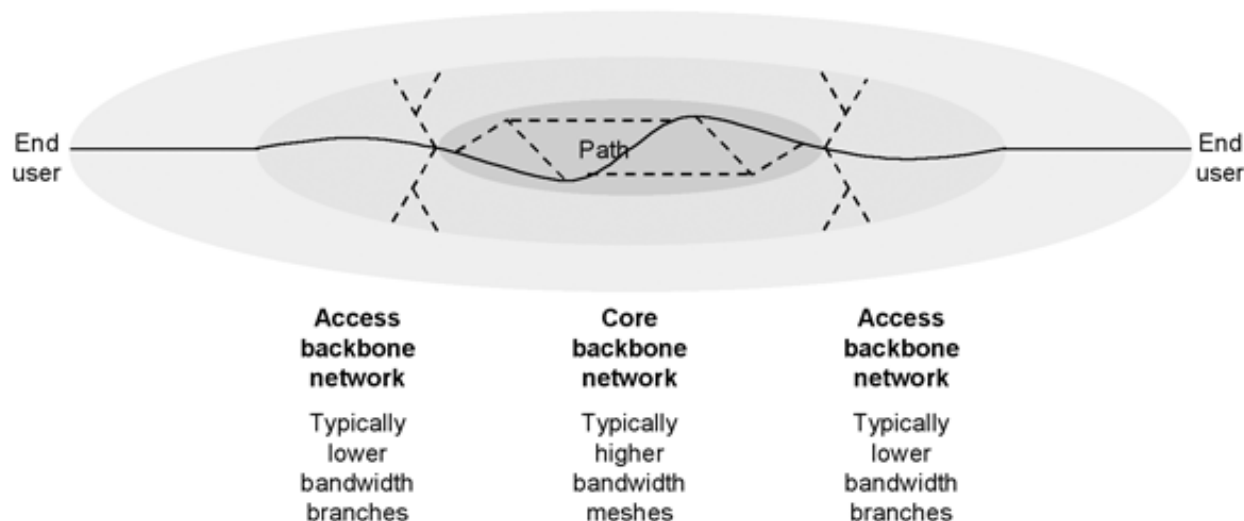
The following distinctions between backbone and access networks should be made:

- The core backbone network (often called the core or backbone network) comprises a mesh of links with at least two routes between any two major nodes. Many incumbent operators' networks incorporate alternative routes, sometimes showing a Figure 8 structure (i.e., two separate national ring routes) linking the key switching and traffic points. In a mobile network also, the redundant links or rings are those between the key mobile switching centres (MSCs) or linking the network's base station controllers (BSCs) to the main MSC. The investment decisions related to these links are very commercial in nature and rarely, if ever, are influenced by universal access (UA) policy or funding; and

- The access backbone networks (often called the aggregation of distribution network), which include the connections to small communities and retail customers, typically comprise a large number of branch links. Typically, access backbone networks connect to a single base station or small fixed network switch (e.g., in a small town or rural area). Many mobile base stations may be connected to a BSC by a non-redundant link. Since the economics of these links may be less certain or marginal, investment decision may be influenced by the availability of UA funding.

The distinction between core and access backbone networks is illustrated in principle in the figure below, although there may be many exceptions and nuances to this simple representation in individual network cases.

Figure: Schematic physical network connectivity



Incumbent fixed network operators often have fibre in their backbones, or at least between main cities and switching centres. Amongst mobile operators, a stronger business case can be made for choosing microwave links rather than for optical fibre links, especially where towers are already installed and can be utilised for base stations. For this reason, some policy makers consider the backbones of mobile operators to be less relevant to broadband traffic. However, chances are that bandwidths are sufficient for current demand and can be economically enhanced when justified by sufficient external demand. Also, many mobile operators are bound to upgrade their backbone networks for expected 2G and 3G service large-scale up-take by consumers.

Typically, investment decisions relating to the core backbone network may well relate to introducing redundancy rather than increasing capacity. However, a motivation based on universal access and service (UAS) requirements might focus on increased bandwidth capacity, so that other operators and Internet service providers can be more readily accommodated. Large increases in capacity may be commercially justified only after data services are very well established.

In summary, because the motivations for UAS and broadband build-out do not usually coincide with operators' motivations, the availability of subsidy may not necessarily influence the timing of core backbone network investments. However, access network extensions, which are more often easily identified with UAS targets, will always have some limited backbone extension associated with them, and the availability of subsidy for them is more influential on the operators' decisions.

It is normal for UAS tenders to include open access requirements on access backbone links so that service providers, other than the initial subsidy recipient, have use of the facilities. This has been for example the case in Nigeria, Uganda and Mongolia. Such forms of mobile infrastructure sharing are increasingly becoming an accepted norm, as noted in [Section 3.4.6](#).

3.4.3 Emerging alternative network options

In some countries, several complete or partial backbone networks may exist as well as those of the incumbent. All of these can be considered part of the country's backbone resource. The following are relevant:

- Competitive network operators (usually the mobile operators) might have built optical fibre links and/or microwave links to avoid relying on connections leased from incumbent network operators. This has been the case for mobile operators in several African countries; most developing countries have at least one mobile operator that possesses an extensive network. Mobile network operators tend to start with microwave links (which can conveniently use many of the towers for base stations), but turn to optical fibre links when capacity requirements grow. This pattern is strong in Nigeria [\[1\]](#). In fact, in many countries the backbone networks of the mobile network operators are now more extensive than those of the incumbent network operator, even if they do not use optical fibre links in their core networks until justified by their own internal economics [\[2\]](#);

- Some specialised network operators might have constructed optical fibre links or microwave links purely to sell transmission and other network capabilities to service providers and to large companies. In developing countries such network operators are unusual, though there are examples of them of in Kenya [\[3\]](#) and Malawi; and
- Electricity, gas and railway companies increasingly have optical fibre links for their own purposes (or rights of way that permit them to provide optical fibre links), which typically carry important but rather small amounts of traffic. These links could be made available for public traffic if regulation permits. In Algeria, the state-owned oil and gas extraction company, and electricity and gas distribution company, have a joint venture to sell their excess transmission capacity [\[4\]](#). But because these optical fibre links have usually been designed to satisfy internal company requirements, not national requirements—railway coverage, in particular—geographical limitations to these links may limit the contribution to existing telephony networks to very few routes. Nonetheless, as noted in [Section 1.6.3](#), at the very least, electricity supply and telecommunications can be co-ordinated, as power poles and ducts can carry optical fibres with low marginal costs.

Encouraging and allowing companies to make their networks available for wholesale and public retail business is an important step in enhancing backbone networks because it increases competition and stimulates investment. There might be a need for safeguards, to prevent cross-subsidy, especially when the companies are dominant in their own main markets. However, mobile network operators in particular, may not feel that they would benefit from selling transmission and other network capabilities to potential competitors. In this case, regulators may consider open access regulation to ensure that backbones do become available.

END NOTES

1. See [MTN Launches 2,500km Fibre Optics Transmission Network](#) (MTN, September, 2006).
2. See [Options for Terrestrial Connectivity in Sub-Saharan Africa](#) (Anders Engvall and Olof Hesselmark, SIDA, March 2007).
3. See [About Us](#) (Kenya Data Networks).
4. See [Sonatrach-Sonelgaz](#) (Sonatrach, July 2007).

3.4.4 Specially constituted network operator

Special backbone network initiatives – as opposed to the creation of open access to existing networks – have become a focus for possible universal access and service (UAS) programming over the last few years. Proponents of such initiatives believe that the main operators will not have enough backbone to match the country's needs and demand for ICT bandwidth. Considering the challenges and complexities involved, special backbone network initiatives require very careful evaluation as to whether or not this is a worthwhile option for an individual country.

A separately owned network operator must be constituted so not to compete with, or discriminate against, its customers. It is controlled by the investors that contributed the funds, possibly with other stakeholders including community interests. Having a specially constituted network operator is most appropriate when the network being managed is being constructed using funds independent of any existing network operator. Section 3.4.4 and [Section 3.4.5](#) discuss alternative ownership and operating modes, which might be more appropriate in certain situations.

Typically, broadband networks developed with public funds, are required to operate by specially constituted network operators and to offer open access, e.g., different Internet service providers may use the broadband links. The Practice Note *Public intervention to support broadband deployment in the EU* gives examples of where this has been done.

The Reference Document *The Alberta SuperNet: An Axia Breakthrough Solution to removing the Digital Divide* refers to a Canadian initiative where an open access backbone network has been commissioned to reach all communities above a certain size, and which is managed by a private sector company under contract. In such cases, the backbone network may ultimately be transferred to the funders under a build-operate-transfer or build-transfer-operate arrangement.

The challenge for such projects is to determine whether the motivation and economic justification for the backbone projects is:

- To increase basic network reach into new regional or rural areas that are, to date, not reached (but that may be increasingly served by mobile operators);
- To increase bandwidth capacity on main routes, thereby encouraging and enabling advanced ICT applications and independent Internet points of presence to grow (this will gradually take place as demand is proven); or
- To support the growth of existing and future competitive operators who might consider the non-availability of an independently owned, open or shared access backbone to be a constraint.

Building a new national backbone is unlikely to be justified by capacity requirements alone, although it may be justified if the existing networks have extremely limited network coverage, organizational capability, and commercial acumen or management capacity. On balance, these situations are terminating where policy environments are truly liberalized, and encourage competition and investment. Hence other alternatives discussed in previous and following sections might, in the end, prove to be more realistic.

3.4.5 Network operators in a consortium

Within consortiums, network operators might still compete with one another, but they will work together in a consortium for a specific backbone or other initiative of common interest. The consortium has limited functions—typically to serve the aggregated demand of the network operators—so it does not inhibit competition.

The consortium is formed and funded privately by certain network operators, with government as a potential partner, and network capabilities being managed by the consortium might be open only to participating network operators, resulting in the risk of restricted market access and market dominance. This scenario differs from having a specially constituted network operator as outlined in [Section 3.4.4](#). If there is to be open access to the network facilities, which is preferable, other operators must be able to join the consortium on fair terms. These terms would include admitting all network operators on payment of fees related mainly to the resources that they require or contribute.

An Internet eXchange Point (IXP) is an example of several investments already managed by a consortium. There is an introduction to the practicalities of setting up such an IXP in the Reference Document *Via Africa: Creating local and regional IXPs to save money and bandwidth*. The consortium might have a less formal structure. A good description of the structural choices that need to be made is at www.euro-ix.net/ixp/startingixp/ and a fairly formal management structure (for an IXP in the UK) is described in the documents at www.linx.net/govern/.

An IXP might also act as a trade association representing Internet service providers to the government and the public (as KIXP in Kenya), or to the providers of international bandwidth in order to secure buying power and economy of scale. The consortium does not necessarily pose a barrier to market entry and success of non-members, as there can be alternatives to joining the consortium (such as bilateral peering and transit arrangements).

Long distance transmission cables: A network operators' consortium is also a way of funding the construction of national or regional long distance cables, both overland and undersea. The members of the consortium may have major shareholders in common, as in Russia for example [\[1\]](#). Sometimes though the consortium mandate is not to provide open access and subsequently enjoys a monopoly or duopoly position, effectively preventing other network operators from entering the market.

END NOTES

1. See [Golden Telecom FOCL Builds a Link to Broadband Access](#) (Golden Telecom, March 2006)

3.4.6 Current and Emerging Forms of Mobile Network Sharing

In many countries that have mobile operators as the dominant service providers, at least one mobile operator may have a near-ubiquitous national transmission network that has potential usefulness beyond the narrow needs of mobile service provision. This network could include the provision of digital backbone facilities from widely dispersed POPs for ISPs. Even if the existing capacity is limited for broadband, an upgrade to provide broadband may be significantly more economic than a completely new network.

In mobile networks, infrastructure sharing might include some physical resources (such as towers and buildings), whole transmission links, or sharing coverage areas (so that different network operators provide equipment in different areas with the understanding that retail customers of the other network operators would be allowed to roam there). Because of the cost savings, infrastructure sharing may be a pre-requisite for receiving Universal Access and Service Fund (UASF) support into new areas. This is seen in several recent UASF subsidy competitions where bidders were required to provide sufficient bandwidth capacity and access to radio towers on any new backbone link financed by the subsidy. Bidders also had to guarantee non-discriminatory open access (on commercial terms) [\[1\]](#).

A Reference document providing a typical Request for Proposal (RFP) and technical specification for this requirement is provided in [section 7 of this Module, Competing for UAS Subsidies](#).

In some countries obtaining construction permits for masts, ducts and buildings can be difficult for a variety of reasons, from the purely bureaucratic to environmental policy perspective. Certainly, sharing towers and buildings is often considered desirable for environmental or aesthetic reasons. There might be advantages for regulators requiring that network operators have sharing agreements in place so that these forms of infrastructure can always be open to other network operators, thereby making second and third applications for permits unnecessary. The government and regulator of India, engaged in a comprehensive economic analysis and industry consultation regarding the potential need and benefits of mobile infrastructure sharing. The regulator, TRAI, published its recommendations on infrastructure sharing in April 2007 [\[2\]](#). An overview of the underlying analysis and outcomes of the initial subsidy competitions are provided in Practice Note "[Sharing Mobile Network Infrastructure in India](#)".

Another option is to allow national roaming, where coverage is shared. This is for example the case in India: India has auctioned mobile licences on a regional basis (called circles) and national roaming is crucial for customers travelling outside of their providers' licensed area. However, where roaming call charges are relatively high, this might not serve customers well. The scenario of operators continuing to generate revenues from expensive calls may act as a disincentive to network expansion unless regulation is enacted to limit retail call

charges and enforce coverage obligations. However, in scenarios where one network operator is more dominant, national roaming may give the less powerful network operator an opportunity to compete in areas it has not covered itself yet. National roaming might be only required for a limited period of time until networks are more evenly built-out.

In several countries, e.g., Austria and Australia, national roaming has been used to support market entry by a 3G network operator that had no 2G network – the 3G network operator has the right to negotiate temporary national roaming agreements covering access to the 2G networks of the network operators that have both 2G and 3G networks. Without such agreements, the 3G network operator would have very limited coverage. With these types of agreements, the 3G network operator can have national coverage but can be motivated to enlarge its own coverage by the potential economies of scale. The Practice Note ["Debates about National Roaming in the EU"](#) discusses this incentive structure.

Endnotes

1. Examples of such open access requirements are in the UA subsidy competitions of Nigeria, Mozambique and Mongolia.
2. [The Telecommunications Regulatory Authority of India \(TRAI\) recommendations on Infrastructure Sharing](#), April 2007.

RELATED MATERIALS

[Module 2, section 6.5, "Mobile Network Sharing"](#)

3.4.7 Funding of backbone initiatives

Like universal access and service (UAS) itself, a national backbone, whether it extends and connects existing networks or is a separate new network, may need to be a candidate for non-commercial funding. This funding may be through a variety of financing mechanisms (Government funding, Universal Access and Service Fund (UASF), public-private partnership (PPP), etc.). The options for funding backbone initiatives are similar to those for funding UAS in general. They include the following:

- **Part of obligations in UAS licences or other regulatory instruments.** Network operators obliged by winning UAS tenders to provide UAS into new areas must extend their backbones to reach certain areas.

As noted in [Section 3.4.6](#), this is illustrated in several recent UAS subsidy competitions, where the bidders were required to provide sufficient bandwidth capacity and access to radio towers on any new backbone link financed through the subsidy, and to guarantee non-discriminatory open access (on commercial terms) [\[1\]](#). A Reference document providing a typical Request for Proposal (RFP) and technical specification for this requirement is provided in Chapter 8 Competing for subsidies.

Depending on the case, these may be minor branch links or quite significant sections of transmission route; or even include core network enhancements. The Nigerian Universal Service Provision Fund is a case where several transmission links of up to 200 km in length, together with customer services – Internet POPs and local access for voice services – are being financed competitively by UAS subsidies.

- **Allocations from public funds.** Network operators could request and receive funds to make their backbones reach certain areas. When more than one network operator competes for funds for the same area, objective methods (auctions) or subjective methods ("beauty contests") can be used to decide between them. Public funds might not be earmarked only for telecommunications, e.g., universities and other technical institutions may have operating functions and applications that require substantial data traffic and might seek funds from agencies that are specifically concerned with education or even just with National Research and Education Networks (NRENs). These funds are not usually intended for creating physical infrastructure though they might be suitable for buying capacity on existing networks.

The Reference Document More Bandwidth at Lower Cost provides recommendations on how universities can work together to obtain more capacity at lower costs, through demand aggregation and other planning actions, which create economies of scale indirectly affecting the cost of UAS.

END NOTES

1. Examples of such open access requirements are in the UA subsidy competitions of Nigeria, Mozambique and Mongolia.

3.5 Other approaches and initiatives promoting UAS

In addition to the main approaches and initiatives for universal access and service (UAS) presented and discussed in the previous sections, there are some other approaches, models and experiences, that might be less known. This Section summarizes these approaches.

While not widely spread, co-operatives are providing communications services in some rural and remote areas. Moreover, there are considerations in the development community, whether co-operatives might be the model to deliver broadband to rural and poor areas.

Experiences to date, success factors and prospects of the co-operative model are discussed in [Section 3.5.1](#).

[Section 3.5.2](#) discusses some examples from various countries, presenting key challenges of rural and regional operators, but also provides the context in which a regional or rural licence strategy could be successful and beneficial, also for broadband.

[Section 3.5.3](#) is dedicated to reviewing experiences with local or community radio stations. Rural radio is not only important for UAS to broadcasting services, but it can also play an important role in spreading the benefits of Internet access.

3.5.1 Rural co-operatives

There are a handful of countries with co-operative models for telecommunications services – Argentina, Bolivia, Poland and the United States of America.

It is important to note that all these co-operative models began operating before the introduction of cellular technology, when fixed lines were the norm. For example, most of Argentina's approximately 300 co-operatives have been operational since the 1960's.

Co-operatives emerged primarily in rural and remote areas where existing national carriers clearly were disinterested in serving those areas because they were considered unprofitable. Many of the Argentinean co-ops are in small, isolated communities in the south (Patagonia) where the two operators at the time, had openly expressed they did not want to serve those communities. Even in the United States, independent telecom providers serve less than 5 per cent of the United States' phone subscribers; 225 co-operatives are a sub-group of independent telecom providers. However, while representing a very small percentage, in these cases rural co-operatives are important to reach and serve these small communities.

Poland is an exception to the fact that co-operatives typically serve areas no other operator is interested. In Poland, a new telecommunications act (1990) created 44 local licence areas to compete with the government-owned incumbent operator TPSA. Not all of these local areas were rural areas only though, they included urban and semi-urban areas. Some of the local licence holders were co-operatives, set-up with the assistance of the National Telecommunications Cooperative Association (NTCA) and USAID of the United States. Typical subscriber size is around 8,500. Two co-operatives are known to be still operational and profitable and have added additional services such as Internet, broadband, radio and TV.

Looking at the co-operative experience, the following factors allowed co-operatives to be sustainable and in some cases even profitable:

- **Providing multiple services** – many co-operatives in the United States also own cable TV or cellular subsidiaries, while the Polish co-operatives added Internet service, broadband and in some cases radio and TV. Argentina's co-operatives often provide other services such as water and power, and in 2007 they have been authorized to provide mobile telephony service;
- **Favourable interconnection agreements or subsidies** – Poland's co-operatives have been established with substantial donor funding and managed to negotiate reasonable interconnection agreements with the incumbent fixed network operator. In the United States the rural operators, including co-operatives, receive subsidies for serving high-cost areas – in 2006 alone, this amounted to USD 4.1 billion;
- **De-facto monopoly position** – historically, most co-operatives started out as the sole telecom provider in their serving area, which meant that they captured all potential demand and did not need to operate under competitive pressure. With the advent of expanding cellular technology, the sole-provider position is often severely eroded;
- **Medium-income countries and service to households** – countries with co-operatives are low-middle income (Bolivia), upper-middle income (Argentina and Poland) and high income (United States). Co-operatives provide service to households and they would not be sustainable in communities where only a minority can afford private service; and
- **Infrastructure and resource sharing** – as many co-operatives also provide other services such as power and water, they have invoicing, accounting and collection mechanisms, and human resources already in place, reducing overhead costs. The sustainability of co-operatives is further increased through management often working without any payment.

Whether co-operative models have a role in future universal access and service (UAS) policies depends on various factors and specific circumstances of the country considering these models. Co-operatives are considered by some as potential model for providing broadband services to communities. A recent example in the United States is the Mid-Atlantic Broadband Cooperative (MBC), created in 2003 by a group of regional leaders whose purpose was to revitalize the regional economy of Southside Virginia. In 2004, MBC created a plan to build over 700 miles of new fibre-optic infrastructure and own the facilities and infrastructure. The project started with USD 6 million in grant funding from the US Department of Commerce Economic Development Administration (EDA) along with additional funding of USD 34 million from the Virginia Tobacco Commission (VTC). Today, the 700-mile fibre network is operational. MBC is an established wholesaler of broadband services, providing the infrastructure necessary to attract businesses to rural Virginia. MBC and the VTC are funding last mile pilot projects in five different Virginia towns. Businesses and residents throughout Virginias are benefiting from MBC's initiative [\[1\]](#).

Some factors e.g., the sustainability issues discussed above and other factors are elaborated in regards to community networks and community involvement in [Section 3.3.2](#). It appears that co-operative models might be preferable for communities or areas not served by commercial providers (who are not enticed by subsidies through a Universal Access and Service Fund [UASF]) or in areas that are served

extremely poorly. Co-operatives might not be appropriate if there are viable alternatives within the market and with commercial providers.

END NOTES

1. See for details <http://mbc-va.com/>

3.5.2 Regional or rural operator licensing

Rural or regional licensing emerged in Latin America in the mid-1990's as a result of the first generation of universal access and service funds (UASFs), as described in [Section 3.2.1](#). These often used VSAT or fixed-wireless technology.

The main challenge of these rural operators today is the encroachment of cellular operators competing with them in areas where they had once been the only service provider. Also, in some remote communities served by VSAT, the operating and maintenance costs outweigh the revenue received and subsidies bid for. It was known, even before mobile phone expansion, that some of these rural operators are not commercially viable [\[1\]](#).

A later example of rural operators can be found in South Africa. Starting in 2002, the Universal Service Agency focused on funding newly awarded Underserved Area Licensees (USALs), previously called SMME – Small, Medium and Micro Enterprises. As the name implies, these operators are licensed to provide voice and data services in under-served rural districts with less than 5 per cent fixed tele-density.

Out of 27 potential licence areas, seven USALs have been receiving grants of SAR 5 million each upon licensing from the Agency and commitments of interest-free loans of up to SAR 10 million over the first three years. Several of the USALs have moved to offering service by reselling mobile services from one of the established mobile operators. The main challenge of the USAL concept is that it has been designed with a fixed-line market environment in mind and then has been overtaken by increased liberalization measures implemented by the government, improving the overall sector environment and speeding market expansion including by mobile operators, but granting less protection to the subsidised USALs.

Some of the challenges for smaller rural or regional operators can be summarized to be the following:

- **Purchasing power** – big equipment vendors might give little attention or support to a small operator, and prospects of volume discounts are slim;
- **Attracting finance** – rural and small operators are typically challenged to raise finance, as their business case might be only marginally profitable and investors might have less confidence and appetite. Thus, some of the early rural operators were actually subsidiaries of VSAT or rural telecom equipment vendors;
- **Attracting human resources** – given a choice, skilled staff and management might be less attracted to small rural operators preferring to work in larger centres;
- **Economies of scale** – the cost of standard elements for a communications service provider, e.g., billing software, are proportionally higher than for a national operator, though software advances, new technologies and customisation might mitigate that;
- **Negotiating interconnection agreements** – smaller operators are in a less powerful position and are not a priority when negotiating agreements with bigger national operators; and
- **Competitive pressure and increased liberalization** – smaller operators are less able to withstand the competitive pressure once the larger national operators expand over time into the least served rural areas i.e., there is no level playing field between an operator holding a national licence and an operator with only a rural licence. Therefore, rural operators typically require a higher degree of regulatory protection, which often complicates the regulatory regime as special tailored regulation is required for rural licensees and goes against the grain of increased liberalization.

Venezuela is an interesting example where regional licences were introduced without a minimum subsidy auction. Due to the fixed-line incumbent CANTV's inability to meet its rural obligations, three regional rural operators were licensed in the mid-1990's, each in a different region of the country. The existing operators were not allowed to tender for licenses. The operators were required to initially meet rural roll-out targets before being permitted to expand their services into urban areas. The regional operators were required to provide service in rural areas – including public phones and fixed or mobile lines – not covered by CANTV.

Over a five-year period after receiving the licence there were operator specific build-out targets for the rural operators ranging from 17,000 to 42,000 lines. Only a small number of main lines had actually been rolled out by the end of 1999. Later, to make the rural licenses more attractive, licenses permitted the operators to offer fixed access, long-distance, international, mobile and multimedia services. In 2006, the two regional operators Digicel and Infonet (both GSM), were bought by Digitel, the third regional operator, to create a national GSM operator. Data on the actual success of these regional licences is limited. In general, rural telephony and Internet penetration in Venezuela is still considered low.

Lessons to be drawn from this experience, also in light of possibly adopting a rural or regional licensing strategy for broadband development, are:

- There is an inherent market tendency for rural or regional operators to become national operators, either by being bought by a national operator or their own drive to grow and become a national operator. Thus, regional or rural operators might be a temporary

phenomena; and

- Introducing regional operators can be an effective tool for introducing new entrants and more competition. If a regional licence is focussed on less well served areas and coupled with the incentive of being converted into a national licence within a reasonable amount of time, it can have the triple results of:
 - increased service in previously un-served areas,
 - increased competition, and
 - a period of time to prepare and adapt to increased competition for the existing player(s).

END NOTES

1. For details see Björn Wellenius, Closing the gap in access to rural communications – Chile 1995-2002.

3.5.3 Community radio and local radio

Community radio or local radio can play an important role in a universal access and service (UAS) policy and programme, especially if the UAS policy covers broadcasting services as well. While there are no fixed definitions of what UAS means in the broadcasting field, there is a certain consensus on what its key dimensions are. These include:

- Reach – UAS requires nation-wide service to be provided to the entire population, including the rural and remote population. Typically, public broadcasters are mandated to provide national broadcast reach. Private broadcasters do not necessarily need to reach the entire nation (though it is beneficial) as long as the population has also access to other local broadcasting media.
- Affordability – This relates to the affordability of the actual broadcasting receiving device (e.g., a radio or TV). In many developing countries, rural citizens can only afford radio receivers as TV sets are often too expensive. Considerations and discussions about TV access on a community basis do exist, and there are promoters of multi-media community centres that include TV (e.g., UNESCO).
- Local media, plurality and diversity – This is the strongest dimension of UAS in the context of broadcasting. It is considered essential to ensure that all citizens have access to a local radio station as a forum for local debates and cultural expression. It is important that local media provide a diversity of content and plurality of information and opinions. Because of its higher costs and greater technical needs, local television is far less of a UAS priority.

Thus, in terms of UAS for broadcasting, the following are main requirements:

1. Nation-wide service by the public broadcaster and/ or private broadcasters; and
2. Access to a local radio station (community or private with public service obligations).

Consequently, many countries believe that local community radio stations are essential. In the developed world, Germany, France, Canada and the United States, all have specific policies for rural broadcasting and community/ local broadcasting stations. The Practice Note *Different local radio models in France* gives an example of a local radio policy. Peru, Bolivia, Colombia, Venezuela, Argentina and Ecuador are all countries that have good broadcasting legislation for rural, indigenous, educational or community radio. In Africa, some of the countries with the best policies for rural radio include Mali, Benin and South Africa. The Practice Note *Rural Community Radios in Mali* give an African example of community radio.

Local or community radio stations are even more important in conjunction with Internet access. In many cases, successful use of the Internet for development requires community intermediaries which can overcome issues of illiteracy, lack of ICT training and language barriers of the Internet. Local rural radio, which has Internet access, is emerging as one such successful intermediary because it is accessible, affordable and cheap to produce. Further, radio is a mass and an oral medium that promotes community interaction and social communication processes. Radio and Internet can benefit from each other in the following ways:

- Internet resources for radios to exchange information and programming, such as InterWorld Radio, providing access to a huge range of journalists' reports on a variety of topics; and
- Radios using the Internet to provide a variety of information to their listeners; a well-known example is the UNESCO-supported Kothmale Internet Project in Sri Lanka.

Definitions

In South Africa, a "community broadcasting service" is defined in the Broadcasting Act 4 of 1999 as a broadcasting service which:

- Is fully controlled by a non-profit entity and carried on for non-profitable purposes;
- Serves a particular community;
- Encourages members of the community served by it, or persons associated with or promoting the interests of such community, to participate in the selection and provision of programmes to be broadcast in the course of such broadcasting service; and
- May be funded by donations, grants, sponsorships or advertising or membership fees, or by any combination of the aforementioned.

In France, in addition to local community broadcasting, the regulator, Conseil Supérieur de l'Audiovisuel (CSA), distinguishes between three types of local radios:

- Community local radio;
- Commercial local radio service without national programming; and
- Commercial local radio service that also broadcasts national programming.

Whether or not the local station is a community station, an important part of its mandate is to provide a local forum and it is therefore desirable that it be locally owned and that it meet certain obligations regarding community access and local production. Without these obligations, they could be 100 per cent repeater stations for programming coming from the capital, at the expense of local access.

Funding and sustainability

There is a range of funding options for local community radio stations. Most often, community radios finance themselves through a combination of national and international donations, advertising, sponsorship and membership fees. However, in developing countries membership fees are very rare.

Examples of funding models that have been mandated by government policy include the following:

- In Colombia, the Universal Access and Service Fund (UASF), Compartel, is managed by the Ministry of Communications, and has a joint programme with the Ministry of Culture and a special government fund for Development Projects known as FONADE. The fund provides partial financing for community radios under a programme called "Comunidad". Currently, Compartel has financed between two to six community radios in approximately 25 departments of Colombia. Compartel receives its money from a levy mainly targeting telecommunications operators, though commercial broadcasters must also pay into the fund. The Practice Note *Colombia's universal access to community radio* gives more details about Colombia's model. However, Colombia's specific programme for community radio is an exception among UASFs. The UASF in Peru is only occasionally funding pilot projects that have some community radio element, but are focussed on the Internet. Ghana's UASF, GIFTEL, is authorised to fund community media projects that combine Internet and community broadcasting;
- Other governments, such as South Africa and Mali, provide no particular financial support to the community radios, thus they have to finance themselves. In some poor communities in South Africa, this policy is creating problems as the people do not have the advertising expenditure to support a community radio station. While Mali has over 300 community radios, a number are struggling. This situation is complicated even more in instances where old equipment needs to be replaced;
- France has a special fund for local community broadcasters, which is sourced by a special tax levied on radio and TV advertising expenditures and paid by advertisers. Qualified stations can receive partial funds to assist with the initial installation, to subsidise some of their operational costs and to subsidise equipment purchases. However, the community radio stations must fulfil certain criteria which determine if and how much funds they receive, and meet specific criteria for accepting the funds. These criteria include the community stations' capacity to secure some local funds, and the quality of their programming. Conditions include a ceiling of 20 per cent of advertising of their total annual turnover, and broadcasting four hours of local programming daily;
- In some countries (e.g., the United States, Chile, Mexico and Brazil), governments impose restrictions on community radio stations in regards to advertising. These restrictions are either absolute, such as no advertising allowed, or there may be a ceiling, such as no more advertising above a certain limit (see the France example above). Botswana is unique in that the acceptance of national and international donations by community radio stations, are only allowed in the first years of the organization's establishment. Lastly, restrictions can be content-related, such as no sponsorship from political parties or only local advertising; and
- In South Africa, community radio stations receive preferential tariffs from Sentech, the signal distribution company, based on a review from Sentech, itself, and the Department of Communications. Previously, community stations were not using Sentech because they could not afford it and had reverted to their own signal distribution. This resulted in inadequate coverage. More details about the South Africa experience is contained in the Practice Note *Rural community radio in South Africa*.

In conclusion, some partial funding of local community broadcasting stations is clearly beneficial, and can be sourced from both government funds and a small levy on advertising revenues. However, it also seems important that community stations should be required to raise some funds themselves and apply for funds. These terms are necessary since not all stations may need support. Moreover, the inclusion of application criteria would establish some minimum quality controls in the distribution of assistance. It is proposed that the criteria should not necessarily involve judging the content of programming, but rather focus on indicators such as:

- The amount of local programming;
- The amount of support the radio station receives from the local community it serves; and
- The amount of community participation and/or involvement in the programming.

In addition, it appears crucial that community stations, while being non-profit, should have the opportunity to generate their own funds by as many means as possible. Restrictions on their ability to generate revenue, if imposed, need to be carefully selected. An example of a positive restriction would be the limiting of political party sponsorship during non-election periods.

Enabling support, especially through regulation

The review of various case studies of community radio clearly indicates that enabling support and good regulation for local community radio stations is important for their success. Key features of good regulation and enabling support are as follows:

- Waving or limiting payment for radio spectrum to a minimum e.g., paying USD 20 annually for frequency allowance (Colombia, Mali);

- A special support office within the Ministry of Communications dedicated to assist community radio stations (Colombia);
- Simplified procedures for obtaining community radio broadcasting licences (Colombia, Mali), including the elimination of unnecessary engineering studies;
- Making technical expertise available to community radios (considered in Colombia);
- In South Africa, France and Mali, development of national associations of rural community stations which are dedicated to supporting and lobbying for rural community stations. Also, they are often better able to attract national and international funding for training programmes etc.;
- No licence fee requirements (Mali);
- Clear regulation from the outset - in South Africa, the Independent Broadcasting Authority issued community broadcasting licences starting in 1994 but only clarified the regulatory framework for these licences in 1997, which caused many community stations to operate in uncertainty and on temporary licences;
- Sufficient capacity of the regulator to handle community radio applications (South Africa); and
- Sufficient licensing length - initial temporary licences such as those in South Africa are clearly not advised. In France, community stations receive licences for five years, and can apply for renewal after five years.

4 Universal Access and Service Policy

CHAPTER 4 TRANSLATIONS

 [Version française \(PDF\)](#)

 [Versión Española \(PDF\)](#)

This chapter addresses all aspects and considerations related to developing a universal access and service (UAS) policy. It is intended as a practical guide to the various steps that need to be taken in the process of policy formulation.

It covers three main themes of UAS policy formulation and implementation:

- The framework, context & institutional considerations of UAS policy, including its relationship to broadband policy is discussed in [Section 4.1](#);
- The UAS policy development process, including consultation, finance and economic analysis which is described in [Section 4.2](#); and
- Legal and regulatory modifications that are likely required for UAS policy implementation are discussed in [Section 4.3](#).

The chapter provides an overview of the various considerations, steps and analyses that go into developing a UAS policy. [Chapters 5, 6, 7 and 8](#) of this Module discuss most of the issues in more depth and also provide greater insight on how to implement a UAS policy.

4.1 Universal access and service policy framework

[Section 4.1.1](#) makes the case that since both developing countries and developed countries typically include both universal access and universal service provisions, the term universal access and service (UAS) policy should therefore be used as the generic policy name.

Before developing the specific UAS objectives, targets and strategies, the overall policy context and relationship of UAS policy to other policies should be examined. This is discussed in [Section 4.1.2](#). In particular, [Section 4.1.3](#) deals with the relationship of UAS to broadband policies.

Discussion as to whether to integrate a UAS policy within the communications sector or ICT policy, or to opt for a separate policy document is provided in [Section 4.1.4](#).

[Section 4.1.5](#) discusses the question of which agency should develop UAS policy and which organization should be responsible for implementing the policy.

[Section 4.1.6](#) concludes with the provision of suggestions on the structure of a UAS policy and the key principles of best practice.

4.1.1 Scope of policy

As more and more countries include both concepts of universal access and universal service in their policies, it makes sense to use the generic term universal access and service (UAS) policy. In the past, developing countries typically focussed mostly on universal access (UA), meaning community and publicly shared access, as UA was the appropriate and most feasible target. However, since the maturation of mobile communications, which extended services further throughout the country and lowered access barriers to take up, many developing countries might realistically target universal service (US) for telephony in urban areas. Furthermore, in addition to UA targets in rural areas, the objective of increasing rural penetration can be set. An example of this is Ghana. In its National Telecommunications Policy of 2004, Ghana has set the objective to achieve a universal service penetration of 25 per cent of the total population, and of 10 per cent in rural areas, by the year 2010, as summarized in the Practice Note *UAS Policy of the Republic of Ghana*.

At the same time, while targets for Internet and broadband service provision typically need to be more modest and focus on public access (e.g., telecentres and cybercafés) and can thus be called universal access targets, increasing private penetration and promoting universal service can be part of the overall policy objective. The trend towards implementing Internet points of presence in semi-urban and rural population centres allows for individual uptake, often first by businesses and institutions. Strategies often include support to early adopters such as schools and colleges.

Increasingly, UAS policies include backbone provision as an element of their policies, often to extend the existing national backbone to more remote locations as required, to add a second tier backbone that increases the capillarity beyond the main routes or to upgrade capacity to broadband.

In the more developed world which previously had universal service as its policy goal, the onset of broadband has led to re-use of the term universal access. It is often recognized that universal availability of broadband services and affordable access to those services may not necessarily yield universal service-like household penetration for many reasons, at least in the medium-term, even though the provision of affordable access is an important goal.

Also, although many middle-income countries, as diverse as Malaysia, Botswana and Saudi Arabia, may not yet have achieved UA in all rural areas, it is reasonable that they contemplate the achievement of US within the time frame of their policies.

Thus, this chapter speaks of UAS policies. Some countries also reflect both concepts in the name of their policy, executing agency or fund, as seen in the Practice Note *Table of Ministries, Policies and UAS/UASF Executing Agencies*.

4.1.2 UAS policy in context

Most countries have a telecommunications, communications or electronic communications policy. Some countries are broadening its scope and calling it an Information and Communications Technology (ICT) policy, including broadcasting and IT [1]. Some countries with a telecommunications policy may also have a separate national ICT policy or strategy, or an information society policy. In addition, some countries have separate broadband policies, which stand alone in addition to the telecommunications or ICT policy [2].

Telecom or communications policies typically focus on the industry, its networks and services, and the role of regulation to ensure fair competition between providers as well as consumer interests. These policies typically cover a wide range of topics, including:

- Basic principles and objectives;
- Liberalization;
- Competition;
- Technology and convergence;
- Regulation;
- Interconnection; and
- Pricing and consumer rights.

National ICT policies typically concern themselves with readying the country, its economy and society for the information society. This usually cuts across various sectors, including education and health, finance, small and medium business and government (e.g., developing e-government capacity and services). In developing countries two other key elements of ICT strategy are often human resource development (including enhancement of education and training) and fiscal measures (e.g., reduced import duties on computers, network equipment and software).

Telecommunications and ICT policies often have a component that relates to universal access or service. Telecommunications policies typically set the objective of providing affordable communications to all citizens and to achieve regional equity, or balance, in the development of networks and services. There are often specific sections addressing universal access or service (UAS). National ICT policies may also specifically address methods of promoting equal access, serving remote and rural areas and reaching disadvantaged population groups (e.g., women, the elderly, certain indigenous people).

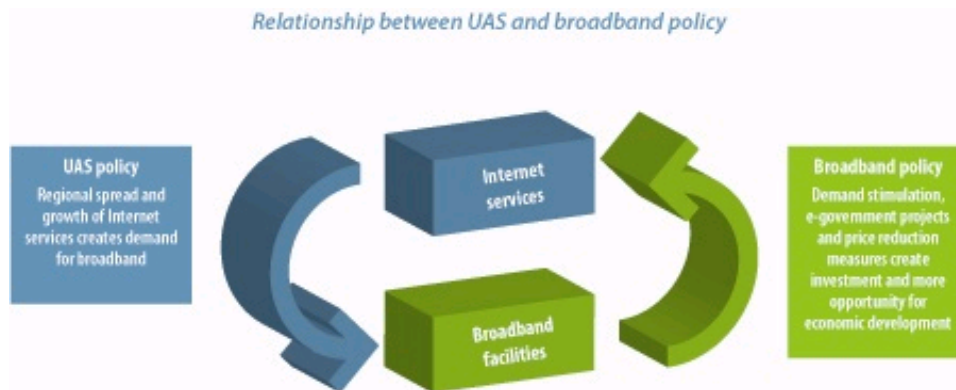
A UAS policy therefore sits under the umbrella of the larger communications and national ICT policy. If it is a separate policy document, it is typically more detailed and includes specific strategies and implementation arrangements to achieve UAS. When most of the main principles, the importance of communications to socio-economic development, and equal access, have already been addressed in the communications sector policy, the UAS policy tends to focus on mechanisms for funding UAS and the main measures and instruments used to achieve the policy goals. This includes the vision, objectives, structure, and administrative or operational practices of a Universal Access and Service Fund (UASF) if that funding mechanism has been chosen.

END NOTES

1. The Practice Note *Table of Ministries, Policies and UAS/UASF Executing Agencies* provides examples of policy names in a number of sample countries.
2. For example, Chile, India, Jordan, Malaysia, Pakistan and Singapore have separate broadband policies.

4.1.3 Relationship to broadband policy

Universal access and service (UAS) policies and broadband policies influence each other. UAS policies promote the regional spread of Internet services and stimulate demand, which in turn can increase the demand for broadband. On the other hand, broadband policies use a range of regulatory and fiscal options to reduce costs (e.g., international gateway liberalization) and facilitate broadband network investment, which in turn facilitate better access at lower prices. The figure below illustrates the interplay between UAS and broadband policy.



Source: ITU-infoDev ICT Regulation Toolkit – UAS Module

Several countries have separate broadband policies. These include Chile, India, Jordan, Malaysia and Pakistan. The purpose of having a broadband policy generally springs from the perception of government that acceleration in the growth and geographical spread of broadband-capable networks can facilitate enhanced Internet and ICT services and implementation of Next Generation Networks (NGNs).

In other countries, where broadband is well advanced in general, the boundaries between a UAS policy and broadband policy can be blurred, and in some cases the two policies are merged. The reason is that UAS becomes all about broadband once telephony targets have been achieved. For instance, Chile has a new Information Society Universal Access policy, which encompasses the broadband policy and the Universal Access and Service Fund (UASF).

Some other governments are also considering the use of UASF resources to increase the reach of broadband networks and services into regional and rural areas that are beyond market-reach. However, issues of financial sustainability and the regulatory environment required for broadband to thrive commercially must be addressed first.

It is generally recognized that the commercial justification of broadband itself depends on the growth in demand of enhanced speed Internet and also on the deployment of e-government and e-commerce services that are broadband dependent. Since there is a debate about which should come first – the network capacity or the demand – some governments are increasingly thinking about the policy challenge of how to encourage or facilitate more ubiquitous deployment on national IP backbones (especially optical fibre systems), especially into lower population areas, such as to the rural district centres and broadband access networks.

Country examples

The pre-amble to India's broadband policy published in 2004 recognizes and highlights the two sides to the broadband issue:

Recognizing the potential of ubiquitous broadband service in growth of GDP and enhancement in quality of life through societal applications including tele-education, tele-medicine, e-governance, entertainment as well as employment generation by way of high speed access to information and web-based communication, government has finalized a policy to accelerate the growth of broadband services.

Demand for broadband is primarily conditioned and driven by Internet and PC penetration. It is recognized that the current level of Internet and broadband access in the country is low as compared to many Asian countries. Penetration of broadband, Internet and Personal Computer (PC) in the country was 0.02 per cent, 0.4 per cent and 0.8 per cent respectively at the end of December, 2003. Currently, high speed Internet access is available at various speeds from 64 Kbps onwards and presently an always-on high speed Internet access at 128 Kbps is considered as broadband [\[1\]](#). There are no uniform standards for broadband connectivity and various countries follow various standards.

Government envisions an accelerated growth in Internet penetration and PC as the success of broadband would largely be dependent on their spread [\[2\]](#).

The following statement from Pakistan's broadband policy highlights the regulatory, content and fiscal measures required to enable broadband take-up:

Broadband lessons from the world markets

Countries with high penetration of broadband users such as the Republic of Korea, Japan and Canada have all implemented conscious policies for the growth of broadband in their countries. These policies have included growth enablers such as price reductions for the use

of infrastructure, unified licensing for service providers, the government's setting of strict annual broadband penetration targets, content and e-commerce development incentives and lowering of the price and tax barriers on the broadband terminal equipment. The resultant growth and high penetration of broadband has contributed significantly to the social and economic standing of these countries. Realizing the social and economic benefits of broadband, other countries such as India and Egypt have also recently issued similar strategies for the growth of broadband in their countries [3].

It seems therefore recommendable for countries to formulate specific and stand-alone national broadband policies, that address the whole range of available options and measures that can elevate broadband infrastructure development and facilitate content and service development in key sectors such as education, health, business and finance which in turn stimulate and encourage broadband uptake and usage. UAS policies then can complement the national broadband policies, by addressing areas and customer groups that are beyond the market and require special (financial) intervention to gain access to basic broadband services (e.g. the minimum acceptable speed of what is considered broadband at the time).

Measures for rural expansion

The desire to accelerate broadband facilities into rural areas is the added driving force that makes a national broadband policy relevant to UAS policy. The possibilities for financing broadband infrastructure to reach beyond the market include:

- The use of government finance as direct investment through public-private partnerships (PPPs);
- The use of frequency auction receipts by government to finance open-access national broadband networks, managed by an independent management company; and
- The use of UASF resources as a smart subsidy under competitive tendering for supply of infrastructure.

However, as noted above, a broadband policy typically includes several other measures designed to reduce costs and prices, stimulate the use of enhanced services, and give incentives to service providers. Thus, a UAS policy can complement a national broadband policy. Broadband expansion to rural areas is only usefully included within a UAS policy if the fundamental barriers to its deployment – regulatory, commercial and demand based - are addressed at the higher level of a national broadband policy that deals with creating an enabling environment (see also Section 2 on Sector Reform).

END NOTES

1. In 2008, broadband is defined as always on Internet access with a speed equal or greater than 256 kbps by the OECD.
2. [Broadband Policy 2004](#), Government of India, Ministry of Communications and Information Technology, Department of Telecommunications.
3. [Broadband Policy for Pakistan, Nov 2004](#), Ministry of Information Technology, Government of Pakistan.

4.1.4 Integrated or separate UAS policy

There are three possible scenarios for a universal access and service (UAS) policy document:

1. The UAS policy is incorporated within either the communications or ICT policy and UAS concepts and objectives are well fleshed out;
2. The UAS policy is a separate policy document where the communications or ICT policy pre-exists but contains only brief references that require expansion; or
3. The UAS policy is formulated as a stand-alone policy but written into regulations, giving greater force and details to the more general UAS references contained in a communications or ICT policy.

Any government in the process of renewing its communications or national ICT policy has the option to integrate the UAS policy into it. Helpful considerations in deciding whether this is desirable or not, might include:

1. Are there political considerations which might make it desirable to have a stand-alone, prominent UAS policy;
2. How large an issue is UAS? If a large part of the population and country is already served, UAS might not need a separate policy and can be sufficiently addressed within the communications or national ICT policy with the help of regulation;
3. How long is the UAS policy document? A long UAS policy might justify a separate policy document; and
4. How well defined is the UAS funding mechanism?

In some cases, even if the first three conditions favour incorporating UAS into the main sector policy, the fourth, funding, is often sufficiently crucial to justify a separate UAS policy. Saudi Arabia and Pakistan are good examples of countries where the UAS policy is almost wholly focussed on the objectives and practices regarding the UAS Fund. These policies are provided in the reference documents, The Universal Access and Service Policy and Universal Service Fund Policy. Alternatively, UAS funding mechanisms can be implemented through special regulations. Nevertheless, it is possible that a new UAS policy and regulation may require changes in legislation, discussed in [Section 4.3](#).

4.1.5 UAS institutional framework

Related to the questions surrounding where to locate a universal access and service (UAS) policy, are the following questions:

- Who should develop and draft UAS policy; and
- Who implements UAS policy?

Who should develop and draft UAS policy?

Typically, a UAS policy is developed by the ministry responsible for communications (or in countries without a ministry by the entity responsible for communications), often with significant input or even responsibility for drafting by the regulator. That ministry might of course be constituted in one of several ways:

- Telecommunications;
- Electronic communications (including broadcasting and other media);
- Information and Communications Technology (or Communications and Information Technology)
- Infrastructure, including transportation;
- Combined with industry or science and technology; or
- Combined with another sector such as economic affairs.

Ministries other than the one responsible for telecommunications and ICT (e.g., education, science and technology, economic planning, finance, municipal and local government) are also usually considered to be stakeholders. For example, one or more might have a seat on the Board of the Universal Access and Service Fund (UASF). However, their involvement in the UAS policy development and drafting is usually one of contribution to a consultation process rather than as an actual sponsor of the policy.

Consultation is strongly recommended as a part of UAS policy development. The telecommunications and ICT industry, as well as non-government organizations (NGOs), should also be part of the UAS consultation process, as discussed in Section 4.3.6.

Who implements UAS policy?

UAS policy may be implemented by the country's National Regulatory Authority (NRA), the ministry responsible for telecommunications and ICT, or an independent agency established to manage and administer the UASF. Each is considered below.

Regulator

Many countries opt to have the independent NRA responsible. This is a sound approach for many developing countries because:

- The regulator typically has the required industry sector expertise, and skilled technical, economic and financial staff;
- The regulator has a degree of independence and is perceived to be one step removed from politics; and
- The regulator has established relationship and credibility with industry that is often the main partner in implementing UAS policy.

There is a trend towards multi-sector regulation, including broadcasting. Under this scenario, the same reasons apply for it being responsible for UAS implementation.

Ministry

In a number of countries, the ministry responsible for communications implements UAS policy (e.g., Colombia, Guatemala, India where the ministry manages the UASF). This has the apparent advantage that the agency responsible for policy is taking responsibility to carry it out. However, the main disadvantage is that since the UAS policies sometimes include special financing instruments (e.g. a UASF) for which the main contributors are the industry (either through a levy or use of frequency receipts), government is not perceived as being far enough removed to be an independent administrator of the finances, especially if the government has any ownership interest in the industry. Operators may view the additional collection of a UAS levy by a government ministry as representing another form of taxation, or they may perceive that the funds could be too easily taken into the general budget account. On balance, international practice indicates that government as UASF administrator is not the best approach.

Independent UAS Agency

A few countries have opted to establish a separate agency. South Africa [\[1\]](#), Pakistan [\[2\]](#), Ghana [\[3\]](#) as well as the United States and Canada have established separate UAS agencies. Peru and Nigeria have independent banks or trusts as the financial managers for a UASF, even though the regulator in Nigeria has the planning and secretariat role while the Peruvian fund is under the Ministry for Transport and Communications.

While a completely separate agency elevates the status of universal access and service and creates at least the appearance of even greater independence, it comes at a higher cost as well as with increased complexities of co-ordination.

The Practice Note *Table of Ministries, Policies and UAS/UASF Executing Agencies* provides a tabular summary of the practice in this regard for a representative sample of countries.

1. [Universal Service and Access Agency of South Africa](#) (USAASA)
2. [Universal Service Fund Company of Pakistan](#)
3. [Ghana Investment Fund for Telecommunications](#) (GIFTEL)

4.1.6 Basic structure and key principles of UAS Policy

Whether it is a fully integrated policy document or is limited mainly to the financing aspect of universal access and service (UAS), a UAS policy should adhere to policy formulation standards, processes and formats. Although these may be unique to each individual country, as a general guide the following elements are usefully addressed in the policy. The structure of existing UAS policies do vary quite substantially. A suggested general outline of main sections, which reflects best practice for policy formulation, is as follows:

- Introduction & background;
- Status of the telecommunications and ICT sector;
- Vision, policy direction and objectives;
- (Optional) Key challenges and barriers;
- Strategic mechanisms for the implementation and funding of UAS;
- Implementation arrangements;
- Principles of operation of the chosen instrument(s), for example
 - Universal Access and Service Fund (UASF);
 - Mandatory service obligations issued with new licences;
 - Competing for subsidies;
 - Regional operators;
 - Infrastructure sharing;
 - Etc.
- Monitoring, evaluation and review.

This outline is expanded in Practice Note *Model outline for a UAS policy* which includes features found in most countries' UAS policies and which suggests a general standard for policy structure. Because of the options available and varying context from country to country, any outline used as a model has some overlapping or country-specific content which can be eliminated, adapted or relocated elsewhere in the document.

In terms of policy approach and strategies, a balance is required between providing policy direction and guidance while allowing some flexibility during implementation, i.e., during the design of the UAS programme, targets and schedules. It is helpful to formulate core principles and values within the policy, while the aspects related to execution and targeting of these principles and values remain flexible. An example of principles that are considered best practice is described in the Practice Note *Key principles and approach to UAS policy implementation*.

4.2 Universal access and service policy development

Developing a universal access and service (UAS) policy generally begins with these essential questions:

- Who is the lead ministry or entity developing the UAS policy (see [Section 4.1.3](#));
- What is the main purpose for developing the UAS policy? (e.g., social harmony/ regional balance; economic growth; global competitiveness; reduction in rural to urban migration; poverty reduction); and
- What are the UAS aspirations (e.g., there can be different emphases on telephony, Internet and broadband – while all three might be desired, the main focus could be any of them).

After determining the scope and primary concepts of the UAS policy, there are several stages and procedural elements involved in developing the policy, which are described in this section:

1. Sector review – establishing the current status quo, barriers to growth, potential solutions and UAS strategic options ([Section 4.2.1](#));
2. Policy formulation – setting specific objectives, time-bound targets and strategies to achieve those goals ([Section 4.2.2](#));
3. Regulatory measures – their priority over other government interventions and their ability to reduce costs of implementing the UAS policy ([Section 4.2.3](#));
4. Financial analysis – identifying the required financial resources to implement the policy ([Section 4.2.4](#));

5. Economic appraisal of UAS options - using strategic socio-economic considerations for policy development, and micro-economic analysis to decide on priorities and sequence within a UAS programme ([Section 4.2.5](#)); and
6. Consultation – several stages of consultation with various stakeholder groups to solicit input, feedback and develop broad buy-in ([Section 4.2.6](#)).

Policy development is likely to require a few iterations. For example, input from consultation can result in adjustments or changes to the draft UAS policy before it is finalised.

4.2.1 Sector review and market analysis

Formulating a universal access and service (UAS) policy begins with a realistic assessment of the current status of the sector's services reach, in order to be able to chart a roadmap of where the country wants to go in regards to ICT and UAS. A key questions is:

- What is the country's status quo in terms of universal access and what progress has been made towards universal service? In particular, what areas and population groups do not have access to ICT services?

A number of activities and methodologies can be used to provide the underlying data and analysis necessary for the development of UAS policy. These are as follows:

- **Background study and database:** This is a brief desk study that summarizes the geographic, demographic, socio-economic and cultural composition of the country. Ideally, the data base and analysis should be broken down to the smallest local administrative level for which it is feasible to collect data. This is often at the district level, but in populous countries, or ones where data is freely available, data to sub-district level is desirable. Household income and expenditure data is especially useful; details of the desk study are discussed in Section 7.1.1.
- **Telecoms and ICT sector review:** This encompasses an inventory of existing infrastructure and services around the country, but also includes a review of the policy and regulatory environment for ICT, and possibly even the investment and business environment. Usually, the best approach is to interview the ICT industry players directly who will provide data on current network services and reach, as well as future plans, views on market trends, and their opinions on universal access (UA), rural communications and progression towards universal service (US).
- **Coverage and GIS maps:** The information gathered from reviews and studies can be represented with coverage and GIS maps. However, because the ICT market is evolving rapidly, data can quickly be out of date. The focus of the ICT sector review should be to enable a policy formulation based on an understanding of the current situation and near future developments; it does not require absolute accuracy. It is nevertheless, helpful to set up a process and structure that allows for regular reviews (e.g., annually) of the ICT sector and of UAS related data.
- **International review:** Policy makers benefit from researching and discussing current best practice and trends for UAS, especially of countries that have comparable characteristics and challenges.
- **Demand studies:** These are particularly valuable as they gather information from the intended beneficiaries of the UAS policy in regards to their actual UAS needs. By investigating affordability, crucial information is gathered to model the subsidy requirements for various UAS objectives. Details are discussed in Section 5.2.

The above approaches and methodologies provide a good foundation for developing UAS strategy and policy. The analyses will highlight required targets, strategies and solutions to achieve UA and a country's progress towards US.

4.2.2 Policy formulation

After the sector review process has provided a foundation of data, analysis and initial viewpoints from various stakeholders, decisions on the following key questions need to be made:

- Which **services** (e.g., telephony, Internet, broadband but also directory assistance and access to emergency numbers) should be included into the universal access and service scope (see also [Section 1.1.5](#) and [Section 1.1.4](#));
- Which specific **targets** for each of the services should be set;
- What **main groups** should be targeted (e.g., rural population, urban poor, people living in socio-economic depressed areas);
- What other **special targets** are advisable e.g., schools, libraries, hospitals, etc.(see also [Section 1.1.2](#) and [Section 1.1.7](#));
- What **timeframe** should be set for certain targets to be achieved and what timeframe will the UAS policy cover;
- What **approach** should be used and which **strategies** employed, covering
 - Estimating cost of achieving set targets and whether public funding (subsidies) is required;
 - Who will provide the funding and how is it collected;
 - Who will deliver the services (e.g., operators and service providers, NGOs, entrepreneurs, etc.); and
 - How will those entities be selected.

- **Future proofing:** How will the policy be adjusted to reflect market changes over time?
- **Who** is going to take the lead in the implementation (including coordination and monitoring) of the UAS policy?

The following table [1] provides an illustrative example, comparing the status of services and UAS targets in different types and sizes of localities.

Table: UAS programme current status and targets									
Geographical category	Current status and target dates								
	Existing fixed or mobile network reach	UA Telephony (fixed or mobile) 100% public access		US Telephony Hshid penetration to reach above 75%		Internet Point of Presence & Public Access Centre (one per community)		Internet access to all schools	
		Current status	Target date	Current Typical	Target date	Current status	Target date	Current status	Target date
Urban centres	100%	100%	n/a	67%	2009	n/a	n/a	80%	2009
District Centres	100%	100%	n/a	50%	2010	50%	2010	30%	2010
Villages above 5,000	90%	80%	2009	33%	2011	20%	2012	10%	2012
Villages above 2,500	80%	70%	2010	25%	2011	10%	2014	5%	2014
Villages above 1,000	75%	60%	2010	20%	2012	None	2016	2%	2015
Villages above 500	60%	40%	2011	20%	2013	None	2020	None	n/a
Villages above 250	50%	30%	2012	Low	2016	None	2021	None	n/a

Source: ITU-infoDev ICT Regulation Toolkit – UAS Module

The elaboration of urban and rural locality classifications and the population-specific targets typically are established through the development of a strategic programme.

A simple way of stating policy objectives is illustrated by the UAS Policy of Saudi Arabia, which sets overall targets for UA and US within specified timeframes. These are as follows [2]:

Table: UAS policy targets in the Kingdom of Saudi Arabia (2006)		
Service	Target dates from commencement of UAS Programme	
	Universal Access [Public access at all mandatory service locations]	Universal Service [Available private service within 5 days of demanding in all mandatory service locations]
Telephony	3 years	5 years
Internet	5 years	7 years

Source: ITU-infoDev ICT Regulation Toolkit – UAS Module

International and regional goals and in-country focus

Internationally relevant for universal access and service (UAS) are the World Summit on the Information Society (WSIS) objectives, and the Millennium Development Goals (MDG), discussed in Section 1.5, as they allow countries to develop their own UAS goals in context with global aspirations. Also, regional organisations and their formulated goals for UAS might be helpful benchmarks for countries. For example, the association of regulators of information and communications for Eastern and Southern Africa has developed policy guidelines for UAS. The Connect Africa Summit that took place in Rwanda in 2007 adopted five goals to bridge the digital divide in Africa. The ASEAN countries have a working group on universal access and the digital divide and adopted a declaration on Enhancing Universal Access of ICT Services in ASEAN in 2007. The Caribbean community (CARICOM) has also developed a joint agenda for connectivity that includes UAS plans and a Universal Access and Service Fund (UASF) if needed. [3]

However, UAS goals need to essentially be tailored carefully for each country, meet the local requirements and be feasible. Also, in many countries, UAS targets ultimately need to be presented in detail since the network reach and current service status may vary significantly from region to region within a country and thus programme development and targets may need to be set regionally. Having said this, UAS policy itself will usually be limited to making general statements about regional equality, ubiquity and reaching rural areas, in addition to the macro targets as given in the previous example.

Strategic approaches

In addition to targeting universal access to specific services and increased private service, some UAS policies may include complementary measures or objectives, such as ICT training, content development, and Internet national traffic switching, which are designed to improve the UAS environment and user capacity. The following example from Uganda's Rural Communications Development Policy shows a carefully balanced strategy that has proven to be successful [4]:

Table: Elements of Uganda's Rural Communications Development Policy 2001	
Expenditure activities	Proportion of subsidy investment (Per cent)
Public telephony infrastructure	40
Technical enhancement packages (e.g., mounting pole, transmission line and antenna) to enable simple handsets to operate as public access telephones in weak signal areas	3
Internet POPs and wireless access in all district centres	12
Internet Exchange Point (IXP) initiative	1
Internet access and telecentre / ICT projects for vanguard institutions (One per district)	10
ICT start-ups and training (including support of ICT in one school per district)	20
Rural post franchise support costs	8
ICT training capacity investment	3
ICT awareness and ICT content creation projects	3
Total	100

Source: ITU-infoDev ICT Regulation Toolkit – UAS Module

Specific measures to improve penetration and reach universal service

The strong position of mobile communications in developing countries has enabled policymakers to include penetration and universal service targets first for main urban centres, then into smaller regional towns or district centres and smaller communities in a progressive fashion. Guidelines for universal service elements of the UAS policy, targeting households in areas with strong network presence [5] may be as follows:

- A private phone (fixed or mobile), connected to a network service with a selection of tariff options and, in particular, options of usage affordable [6] to households in the lowest decile (10 per cent) of income of the population;
- The service should include access to at least basic data service, with the minimum acceptable speeds determined from time to time by the regulator;
- Information and customer support services should be provided by the operator free of charge;
- The service should include directory service, accessible by dialing a publicized number and provision of information on telephone numbers of (at a minimum) government, businesses and social infrastructure offices connected to the fixed line network. Mobile numbers should also be included where made available by the listed entities;
- Services should provide free phone calls to the area's emergency services (police, fire and health) in the caller's area; and
- Services should advertise options and features to enable customers with sight and hearing impairments and other disabilities to access and make use of the service.

In addition, rural penetration targets should be published. For example, in 2006 Pakistan set an overall target of achieving rural penetration of 6 per cent of its population by 2010, in addition to the targeting of underserved regions for network expansion and specific village-level telephony and Internet UA service targets [7].

Several countries, notably Algeria, Egypt, Tunisia and Nigeria, have national programmes and initiatives to boost PC penetration. The main approach is to negotiate discounts for the price of the PCs used in the programmes, and offering low interest loans and pay-back schemes for households and other beneficiaries to be able to purchase a PC. The Practice Note Programmes to boost household PC penetration summarises the programmes of the above mentioned countries.

Future proofing

Services and targets need to be selected carefully. This is a challenge, as targets need to be feasible, as well as forward-looking and future-proof, so that they are still valid and appropriate during the lifetime of the policy and are not superseded by market developments. Most policies are designed for a five to ten year horizon, while a UAS programme sets targets for one to three years. The policy itself should allow for a process of review and update so that it may adjust targets.

END NOTES

1. The UAS targets in the table are adapted from a draft UAS Policy for Botswana (schools targets are added for representative purposes)

2. [The Universal Access and Universal Service Policy](#), Ministry of Communications & Information technology, Kingdom of Saudi Arabia, 2006,
3. See for more details: www.ariceaonline.org/en/; http://192.132.208.14/eca_resources/news/2007/071106ConnectAfrica.htm; <http://www.aseansec.org/20878.htm>; www.caricom.org.
4. Rural Communications Development Policy for Uganda, Uganda Communications Commission, 2001. The results of the policy can also be seen on the [UCC website](#).
5. Universal service targets adapted from Botswana's Draft UAS Policy, 2006
6. "Affordable" may be considered as 5 per cent of average household income, as determined in many recent rural communications demand studies associated with UAS programmes.
7. USF Policy, Ministry of Information technology, Government of Pakistan.

4.2.3 The priority of regulatory measures

As discussed in [Section 1.3.3](#), best practice addresses the market efficiency gap first through improved sector reform and regulation, and optimization of the investment and business environment and prioritizes the enabling of commercial solutions. This reduces the financing required for a universal access and service (UAS) programme that implements a UAS policy.

Because of the rapid development of the telecommunications and ICT industry, commercial solutions may be more sustainable and arrive faster than policy makers are able to anticipate when designing policy. Policy makers and regulators need to be careful not to waste time and resources planning interventions for areas and basic services that would be better served without intervention. Before implementing interventions involving special finance, for example from operator levies, government budget or frequency or licence auction receipts, for universal access and service, it is best to focus on:

- **Regulatory measures** that create an environment more conducive to competitive network expansion or infrastructure sharing;
- **Fiscal measures** that will make communications service and hardware more affordable to low-income users; and
- **Enabling** activities, such as promotion, advertisement and capacity building that highlight the opportunities available to people, communities and organizations to take advantage of the services offered in the competitive market.

It is conceivable that a UAS policy sets objectives and asks the industry to achieve them voluntarily and will only implement special measures such as a UASF or new licences with UAS requirements, for example, if the market makes insufficient progress towards achieving the UAS objectives.

In summary, minimizing the cost of the UAS policy and programme is achieved through the removal of regulatory and other barriers to the commercial expansion of the market. This in turn reduces the portion of population and geographical areas that must be supported financially. UAS policies can include the objective of removing regulatory barriers to market expansion and efficiency in order to improve the provision of UAS.

4.2.4 Financial considerations and analysis

Financial analysis plays a role in universal access and service (UAS) policy development and implementation. Its role in policy development is considered in this section. A fuller treatment of financing universal access and service is provided in [Chapter 5](#).

In the past, financial considerations related to UAS were often concerned with calculating the costs of UAS provision, using methodologies for calculating net cost (capital and operating costs minus income) and accounting for intangible benefits of a universal service provider. Traditional financing approaches such as cross-subsidization and access deficit charges are replaced by more competitive mechanisms that leverage private investments and sometimes involve universal access and service funds (UASF), where finance is largely provided by the sector itself. With competitive mechanisms, detailed cost calculating is no longer required, and replaced by cost modeling to establish a maximum subsidy ceiling for operators to provide certain UAS services; UAS services are specified including details such as a maximum retail price and quality of service standards. The actual subsidy costs (which in practice might be often lower than the ceiling set) are then determined through a competitive process (see also [Section 3.1](#), [3.2](#) and [Section 7](#) of this Module).

The three main questions related to finance in UAS policy are:

- What is a financially feasible UAS policy, i.e., what is the limit?
- Where should the financial resources for a UAS programme come from; and
- How much finance is required to implement the desired UAS policy and programme strategy?

Other, more detailed questions such as who is responsible for managing the available finance, and rules and mechanism for disbursing funds and their effectiveness are discussed in [Chapter 5](#) and [7](#) of this UAS Module.

Realistic targets

Policy development needs to consider the desired outcome and the financial resources available in order to arrive at a feasible strategy. Countries benefit from having realistic objectives and targets that can be financed without strain, and which they have the capacity to manage.

If policy makers set UAS goals and targets, which for example are so ambitious that to achieve them, would cost perhaps 5 per cent or more of the sector's annual revenues to subsidize, it might be unrealistic to set these goals. But a programme that costs only 1 per cent of the sector's revenues is more realistic, as long as the programme administrator (e.g., the UASF) has the necessary management and staff to administer the projects.

Sources of UAS finance

UAS programmes are generally financed by the following sources:

1. Government general budget; in a minority of cases, including one of the first funds, Chile's Fondo de Desarrollo de las Telecomunicaciones;
2. An annual regulatory levy, as a percentage of annual revenue, on all or certain classes of licensed operators;
3. Various other regulatory sources such as the proceeds of license competitions, frequency spectrum auctions and fees; and
4. Once-only contributions from government, financed by loans or grants from international donors such as the World Bank or other international aid institutions, contributing seed finance to assist UASF start-up in the early years.

The majority of UASFs are financed through annual operator levies, although the legal instruments (e.g., the Communications Law) establishing the fund might typically name all potential sources, or be worded in an open fashion to allow for all possible sources. As noted in [Section 3.2.2](#), operator levies typically range from less than 1 per cent of operator revenues (e.g., in South Africa) to 5 per cent in India and Colombia and 6 per cent on certain qualifying revenues in Malaysia. UASFs are discussed in-depth also in [Section 3.2](#), [5.2](#) and [5.3](#).

However, a stronger case could be made that the funding should, if possible, be more balanced between the first three financing sources. For example Guatemala's FONDETEL uses part of the proceeds of radio frequency auctions and licence competitions to finance UAS programmes. Auction proceeds are paid by various industry players for a national resource. It typically is simply added to the government budget, but it might be more appropriate to use this money particularly for ICT development, such as to fund UAS or special measures for broadband development (e.g. increasing PC ownership or equipping schools with computer labs and broadband access).

As described in [Section 5.4](#), a large number of other sources, including international donors, non-government and corporate, are also involved in financing and supporting telecommunications public access, and ICT projects and applications. These often encompass applications that cut across several sectors of the economy, from education to commerce, health and governance. These investments often contribute most to awareness, market stimulation and capacity building, and so support progress towards UAS.

Finance required to implement UAS programmes

Most often required finance for a UAS programme is estimated in the context of a UASF. However, countries without a UASF might also find it helpful to review the considerations below to determine appropriate operator levies for a UASF. There are two ways to estimate the appropriate level of UASF contributions for each country. These are as follows:

1. **Policy-driven approach** – Determine what scale of subsidy programme would be required to meet the country's policy objectives and time-bound universal access and service (US) targets. The total cost and subsidy estimates are compared to the total sector revenues. The percentage of total sector gross or net revenues calculated by this method becomes the high level estimate; or
2. **Market-driven approach** – Determine from a survey or assessment of operator and other stakeholder opinions, as well as from international benchmarks, what operators would accept or could afford as a reasonable contribution. Then develop the UASF programme to match this.

For many reasons, a hybrid and iteration of these methods recommends itself. The main reasons are:

- Levies based solely on a top down approach may be a political wish list which is not rooted in the reality of what can be achieved, or should be attempted, in a given time frame; However, if the government is willing to add to the finance from the sector or use frequency and licence auction proceeds, a more ambitious programme could be implemented.
- The top down approach with a large and ambitious programme could require a larger than realistic bureaucracy, in the form of UASF staff and programme management, which is costly and is not supportable by the industry alone; and
- The initial estimate of programme cost can be quickly outdated due to the sector's fast pace of development, resulting in much less UASF subsidy required than first thought.

International experience of UASFs indicates that there are no developing countries which have been able to disburse more than 2 per cent of sector revenues in their UASF programme. This might be a helpful guide for countries to size their own UAS programme, even if they do not choose to use a UASF. [Section 3.2.4](#) illustrates that in the major countries that levied 5 or 6 per cent, despite having established sophisticated UASF organizations, less than half of the revenues collected have been redistributed to the sector through subsidies. [Section 5.3](#) discusses challenges of disbursing funds as well as best practice of efficient fund management.

4.2.5 Economic appraisal of UAS options

Detailed economic analysis is typically undertaken at the stage of universal access and service (UAS) programme development, often to determine project priorities, and is less important at the UAS policy development stage. However, broad economic considerations are important in the policy formulation. As discussed in [Chapter 1](#), countries develop UAS policies based on the premise that access to basic and advanced telecommunications and ICT services have a wide-ranging socio-economic rationale. This recognizes the importance of telephony and ICTs as enablers of growth and equality in the country, and competitiveness on the world stage. However, some projects may deliver different types and levels of benefit more than others, or deliver the benefit in different parts of the country, all of which are reasons why UAS programme and project selections need to be made carefully and priorities set between the available options.

UAS implementing agencies need to consider and analyse the economic impact and relative value of the UAS strategic options, programmes or projects, make selections or set priorities in the context of national economic growth, developmental impact (including poverty alleviation), commercial viability, regional balance and related economic concerns.

Key factors that are considered in the implementation stage of UAS policy include:

- The total population reached by each project or potential investment;
- The expected impact and poverty reduction effects, as compared to the vision and objectives of the policy;
- The regional benefits and equalization in socio-economic terms;
- The commercial viability and sustainability of a programme;
- Leveraging of private participation in the UAS programme;
- The subsidy cost per beneficiary; and
- The benefit to cost ratio or Social Net Present Value.

These factors and the economic analysis methodologies used to evaluate them and to set programme and project priorities, are described in [Chapter 6](#).

4.2.6 Consultation

Consultation is a significant part of all policy and regulation development and is considered best practice in universal access and service (UAS) policy development as well. There are several stakeholders that should be consulted during the development of a UAS policy. These potential contributors are:

- **Government ministries** that have a close interest in UAS and need to be involved. Typically, these are the ministries responsible for economic affairs, agriculture and rural development, science and technology, education, health and finance. For example, part of the UAS policy could encompass fiscal measures (e.g., reduction or elimination of important duties on UAS related technology) that require support and buy-in from the finance ministry. Another example is collaboration with the Ministry of Education to ensure that schools targeted for Internet access under the UAS policy are well prepared for the new opportunities through ICT training for teachers, computer labs and ICT teaching material.
- **Industry** – typically, communications operators and service providers are the key partners in implementing the UAS policy, providing the UAS services, and often are the main contributors to a UASF. Strategic decisions concerning the proposed UAS targets, required industry levy, available technologies, and the use and management of a Universal Access and Service Fund (UASF) if chosen, including the subsidy strategy, cannot be made in isolation. It is best to hold industry consultations on objectives and targets early in the planning process. The UAS policy development process is also an opportunity for regulators and industry to dialogue on the functioning of the market and how regulation can help to provide UAS commercially.
- **Parliament** – there may be a special committee that focuses on communications, or at least one or several parliamentarians, including opposition members, who are interested. The inclusion of opposition members on committees might increase the chances that any required amendments to the law are passed faster.
- **Beneficiaries of the UAS policy** – usually these cannot easily be consulted directly (other than through a field demand study). Thus various entities representing the beneficiaries in a broader sense could be consulted, such as:
 - Non-government organizations (NGOs) that work with the disadvantaged and poor;
 - Civil society organizations;
 - Local government representatives in under-served areas;
 - Consumer protection organizations; and
 - Organizations representing a large population group in underserved areas such as farmers' organizations, tea and coffee growers, etc.

Stakeholder involvement is crucial for the support of the UAS policy and its success. If a UASF is chosen to be the mechanism that will

finance the UAS policy implementation, then stakeholder consultation is important for establishing credibility for the fund and its management. If new licences are to be issued (e.g. service- and technology-neutral ones), and used as the main UAS instrument by attaching UAS requirements, as has been done successfully in South Africa and Brazil, then existing licencees need to be involved to strike a feasible balance between the new licences' financial benefits for operators and the cost of attached UAS requirements. Consultation and involvement ensures that industry will buy-in to the new programme and will voluntarily contribute the finances required to support it.

Consultations can be made through public workshops, smaller working groups or a more formal consultation process where a consultation paper is produced, to which written inputs are requested. Consultation with stakeholders varies in its intensity – with some stakeholders, consultations serve as a mechanism for keeping stakeholders informed and up to date, while other stakeholders (typically the industry) need to be involved through more active discussions and working groups. Also, there are different stages of when to consult – some stakeholders provide valuable input at the beginning of the process while others may have more to contribute once a specific UAS policy proposal, that is refined through the stakeholder input, is presented to them. Each country has to determine what mix of consultation is most suitable to the process, but it is important that the following recommendations be taken into consideration.

A formal public consultation process is helpful close to the end of the policy's development, but before the draft UAS policy is finalized. This allows the industry and other stakeholders to respond to proposed elements of the UAS policy. This consultation can include the proposed financing mechanism, proposed targets, and the management structure of the proposed instruments to achieve UAS (such as a UASF).

It is best practice to share demand study data with industry, from areas where UAS projects are proposed, so that maximum knowledge is available ahead of any competitive tendering. Operators will typically conduct their own demand assessments as well. In some consultations, different views regarding demand, customer affordability, construction and operating costs will be presented. This dialogue should be part of a healthy ongoing consultation or working group process, since government and industry are partners in how to reach marginal and remote areas, and will determine what finances will be required.

4.3 Legal modifications and regulations

Once a universal access and service (UAS) policy is developed, legal modifications and further regulations are often required in order to implement the policy. Typical issues that need to be addressed are the following:

- The legal basis for the chosen financing instrument: collecting a UAS levy from operators and service providers (licensees), using frequency and licence auctions proceeds to finance UAS, developing a new licensing regime with attached UAS requirements, or infrastructure sharing, or any other chosen instrument;
- The legal instruments to apply selected financing or implementation mechanisms (e.g., set up of a Universal Access and Service Fund (UASF), authorize its management and fund disbursement, new licensing regimes and draft licences);
- Detailed guidelines on UAS policy implementation, UASF objectives or objectives of any other chosen UAS strategy; and
- Detailed regulations, guidelines and principles of the UASF management and operation, if a UASF was chosen.

The precise amount of required legal revision or additional regulation may vary significantly from country to country depending on how much detail might already be contained in existing law, and on the country's legal tradition. The range of options and minimum requirements are provided in this section.

4.3.1 Legal amendments

As discussed in [Section 4.1.2](#) elements of a universal access and service (UAS) policy can be contained in a telecommunications law or other related law, in related policies (e.g. ICT, broadband, IT, etc) and in implementations strategies and detailed regulations, in addition to the UAS policy document itself.

It is possible that amendments to existing laws may be required when developing and implementing a UAS policy, or in spelling out the details of a UAS provision that already has some legal basis or is mentioned in policy.

The following makes no distinction between countries that may have some previous mention of universal access or universal service (albeit inadequate) and those that do not. In both cases, legal amendments or new legal instruments could be required to enact a new or updated UAS policy, such as to establish or operationalize a UASF, design a new licensing regime, create infrastructure sharing legislation, develop specific public-private-partnership projects, etc.

Required amendments might have to comprise or address the following:

- Legal concept paper to describe the new policy environment or objectives, and the legal instrument(s) or revisions to be enacted to

institute or revise the provisions for UAS (or specific terms chosen by the government for these concepts). This paper is typically required to precede or accompany the new legal drafts;

- Definitions of UAS. Ideally the law should give the regulator (or implementing agency for the UAS policy) the power to revise the UAS definition from time to time in terms of what services are included, etc., based on certain principles;
- Additions to the power of the regulator, or chosen implementing agency, to implement the UAS policy;
- The legal basis for the chosen financing instrument: collecting a UAS levy from operators and service providers (licensees), using frequency and licence auctions proceeds to finance UAS, developing a new licensing regime with attached UAS requirements, or infrastructure sharing, or any other chosen instrument; and
- If a UASF is to be established, its sources of funding and its intended use, how it is constituted, managed and administered and who should be accountable for it.

Depending on the legal customs and traditions of a country, these legal amendments might be quite general, or conversely, specific and detailed. If the law is more general, many of the specifics can be articulated in more detail within regulations.

The advantage of working with regulations rather than detailed and specific law is that regulations can be more readily modified, as they can be passed by a line ministry or the cabinet, while laws typically have to pass Parliament. Thus, key principles, crucial elements and approaches are usually placed into the law to ensure that the UAS policy direction and intention is not fundamentally changed. Smaller implementation details go into a specific regulation, and can be modified if experience shows there is need to vary the approach.

While the law ideally contains the overall objective of UAS, specific targets, procedures and timeframes are best not included, as these can change over time and might need to be reviewed and modified periodically. Specific targets and timeframes are better contained in the UAS policy and, in more detail, in an implementation strategy document, sometimes also called master plan.

In summary, assuming a legal revision is required to enact or change a UAS policy and establish the chosen financing or implementation instrument, the requirement for legal change is usually two-fold, namely 1) a legal amendment to add or revise the scope of the UAS policy, and 2) the legal instrument to establish and grant authority to the chosen financing and implementation mechanism.

4.3.2 Detailed regulations

Detailed regulations are typically required, irrespective of whether a new or revised law is necessary, for the implementation of a universal access and service (UAS) policy.

The following describes the issues which must be covered by regulatory documentation, once the design of the UAS policy has been decided upon:

- Detailed network and service objectives for the regulator or agency to implement the UAS policy;
- Detailed institutional implementation arrangements such as establishing a specific UAS department or directorate within the regulator, or establishing a separate implementing agency;
- The functions to be fulfilled in developing a detailed UAS programme— e.g., defining and zoning areas of the country to determine those which are served, unserved, commercially viable, non-viable, setting strategy, determining priorities, designing projects, monitoring outcomes, etc.;
- Guidelines, principles and procedures of the UAS implementation, any supervisory or monitoring board, or consultative committee (whichever style of direction is chosen);
- Responsibilities such as UAS programme approval, official sign-off on UAS disbursements, and other detailed accountabilities;
- Details on plans for UAS programme annual reports, their implementation, success and challenges, progress towards the UAS objectives and their public dissemination;
- Provisions for periodic reviews of the UAS policy, objectives, strategies and the regulation in case changes in the market or policy-environment require updates.

In case a Universal Access and Service Fund (UASF) is to be established, the following additional regulations are typically required:

- Detailed rules on process and eligibility for UASF disbursement;
- Specific financial regulations, including the holding and investment of UASF funds, eligible costs and expenses, limits on operational and administrative costs, and financial control, reporting and independent auditing; and
- Detailed accounting rules for operators in order to establish the correct UASF licensee levy.

[Section 5.3](#) Institutional issues: Managing and organizing a UASF describes in detail the various issues, options and requirements from a financial and organizational perspective.

Depending on the country's context and legal and regulatory traditions, the above details could also be contained in any of the following regulatory documents, which could in effect be equivalent except in name. These documents are:

- UASF administrative rules and guidelines;
- UASF executive guidelines; and
- UASF manual of operating procedures.

Typically, rules and guidelines are binding regulatory documents, though as stated in the previous section, they can be revised through regulatory decisions or the preparation of succeeding regulations. A manual might have considerable overlap with some of the contents of regulations listed above, but it may be a more practical guide, containing details on staffing, selection of UAS projects for those implementing the policy and administering the fund. An example outline for this kind of document is provided in Practice Note *Outline Manual of Operating Procedures*.

5 Financing Universal Access and Service

CHAPTER 5 TRANSLATIONS

 [Version française \(PDF\)](#)

 [Versión Española \(PDF\)](#)

This chapter addresses issues related to the financing of universal access and service (UAS) and of related ICT infrastructure and service development.

As explained in [Chapter 3](#), prior to the onset of market liberalization, the traditional or administrative approach to meeting UAS objectives was to place certain universal service obligations (USOs) onto the dominant incumbent operator. If losses were incurred from the USOs, it was expected that the operator would finance them through cross-subsidization from profitable network services (e.g., long distance and international), through access deficit charges applied to other operators, or through complicated universal service compensation schemes. Donors and multilateral international financial institutions were often prepared to finance investments into rural areas which were assumed to have low or negative financial returns.

Today, this approach is unlikely to be used; in most developing countries, no one expects incumbent operators to accept USOs any more. Furthermore, since the mobile revolution, rural service expansion has become more attractive commercially, while even the broadband capabilities of mobile and new wireless technologies offer new possibilities for extended service reach.

But some form of funding has to be found to finance gaps which still exist between the market's commercial boundaries and the targets UAS policymakers may wish to reach.

This chapter commences, in [Section 5.1](#), with an introduction to the *general trends in ICT development and UAS financing*, showing the breadth of policies and measures which are either financial in nature or have a bearing on financing and investment for extension of ICT services.

The model of a mainly industry-financed Universal Access and Service Fund (UASF) using the principles of Output Based Aid (OBA) to finance investments targeted under UAS policy has become a well-known financial instrument for developing countries. As noted in [Section 3.2.3](#), there are some legitimate and understandable concerns regarding UASFs, fuelled mostly by a few unfortunate examples. Some operators have expressed preference for alternatives, such as accepting reasonable rural build-out targets in their licence, or negotiating ex-ante specific rural universal access and service (UAS) targets with the regulator in exchange for relief from UASF levies or taxes (this is discussed in [Sections 2.4.1](#), [Section 2.4.2](#) and [Section 2.4.3](#)). Also, there have been concerns raised over the complexity of establishing and managing a UASF. However, negotiating fair UAS contributions for all operators, which are equitable between them and accepted as fair, is not necessarily an easy feat either.

Most of this chapter deals with the issues related to UASF mechanisms:

- *Sources and market capacity* in [Section 5.2](#) considers the limits of the market place to afford and support subsidized UAS investments; and
- *Institutional aspects* in [Section 5.3](#) surveys the range of issues surrounding the constitution and management of UASFs, their staffing, accountability and transparency.

[Section 5.4](#) then discusses *other (non-UASF) approaches* to funding and the strategic collaborative and complementary role that other players can have in the expansion of UAS infrastructure and services.

5.1 General trends in ICT development and UAS finance

Over the last decade, the telecommunications sector has experienced a period of unprecedented growth at almost every level, from mobile telephony to broadband Internet, e-commerce, e-government, tele-education and medicine. At the same time, the style and sources of finance made available for ICT development have shifted radically.

Traditionally, ICT infrastructure financing came either from government budgets and revenues generated by the state post and telecommunications authorities, or from donor and international financial institution (IFI) programmes supporting major capital infrastructure investments. Now, donor community financing plays a relatively small role in infrastructure development, except in some categories such

as Output-based Aid (OBA) finance (see [Section 5.2.2](#)). Donor strategies focus at the government level, mainly on policy and regulatory support with almost total reliance on private capital for infrastructure and service development. Beyond policy and regulatory support, donor, non- government and other institutional initiatives focus mainly on fuelling ICT service application and capacity development.

Private investment depends heavily on the regulatory climate, with government and donor activities playing an enabling role. However, since the market cannot achieve everything policymakers desire without additional inputs, a number of complementary activities now work together to bring about effective investment in ICT services and successful take-up beyond the urban markets. In a 2004 report of the World Summit on the Information Society (WSIS), in the context of infrastructure development and improved access to ICT services, it was noted that national governments and other stakeholders now have “many tools and opportunities available to them to enhance the attractiveness of their ICT markets for investors and financiers” [\[1\]](#).

The mix of key tools and measures for enhancing ICT markets can be summarized as follows:

1. Regulatory reform – in particular, promotion of a level playing field, open access and fair competition for ICT investments and service provision, policies that entice new entrepreneurial investment in under-served areas;
2. Universal Access and Service Funds (UASFs) and other public finance mechanisms such as loan guarantees and public private partnerships (PPPs) to enhance and target investments into priority areas in need of special finance;
3. Fiscal measures – enabling tax, tariff, import, and business regulation policies designed to reduce risks and financial burdens and provide incentives to ICT investors and financiers;
4. Demand support and capacity building – initiatives in e-governance, education and training, budget allocations within the public sector for ICT networking and service applications, as well as government pre-purchase of capacity through open tenders (i.e., the government commits to a medium-term contract with one or more providers to purchase capacity in bulk and hence becomes an anchor tenant, which lowers the risk to the private operator in building the infrastructure). Another measure of demand support and capacity building is open procurement plans that leverage ICT industry competition and private sector development; and
5. Regional investment – support and promotion of domestic, regional and other South-South investments (e.g., mobile communications, software and systems houses emanating from emerging markets), and increased sub-regional and regional cooperation to address infrastructure and last mile gaps.

This trend and balance of activities is underlined by a 2005 report of the OECD's Development Assistance Committee (DAC) countries. The report shows that official government-to-government aid commitments amongst its 22 DAC members for ICT infrastructure declined strongly from USD 1.2 billion in 1990 to USD 194 million in 2002. The rationale for most donors to withdraw from providing ICT infrastructure finance was linked to the correct assumption that the private sector would play an increasingly strong role in the provision of services [\[2\]](#).

Declining donor assistance to ICT infrastructure is only part of the picture for the role of Official Development Assistance (ODA); many donors, while still engaged in some bilateral ICT-specific programmes, are contributing to public private partnerships (PPPs) and international multi-donor initiatives for ICTs, while also integrating ICT components into their development programmes for other sectors. The Practice Note *Donor ICT for Development Programmes and Expenditures* documents this trend for all 22 DAC members of the OECD and the European Union and lists many of the contributions to multilateral and multi-donor initiatives supported [\[3\]](#).

When the additional role of non-government organizations (NGO's) and other private sector organizations, including technology investment trusts, philanthropic agencies, corporate social responsibility (CSR) programmes, and community groups are considered, the spread of activities in the ICT realm is seen to be large. With some notable exceptions, the role of these organizations is generally more related to applications, IT human resource training and capacity building than to infrastructure and service development. They are introduced in [Section 5.4](#).

END NOTES

1. *Financing ICTD*, report of the Task Force on Financing mechanisms for ICTD in Development: A review of the trends and an analysis of gaps and promising practices, WSIS, December 2004.
2. *Financing ICTs for Development – Efforts of DAC Members: Review of recent Trends of ODA and its contribution*; Report to the UN Task Force on Financial Mechanisms for ICT for Development (TFFM), OECD, 2005.
3. The Practice note *Output-based Aid (OBA) explained* in [Section 5.2.1](#) also shows the contribution of several institutions and donors to the multi-lateral trust, Global Programme for Output-based Aid (GPOBA), to provide support for competitive subsidy tendering of UASF style competitions.

5.2 Universal Access and Service Funds

Since many Universal Access and Service Funds (UASFs) have recently been legally established and put into operation, there is a wide array of experience available that can be used to identify precedent and best practices in terms of financial sourcing and the role of the market. In addition, there is a growing body of experience with Output-based Aid (OBA), which relates to the performance-based

disbursements of subsidies typically used by UASFs, after their competitive subsidy allocation.

[Section 5.2.1](#) reviews the different sources which can provide finance for a UASF; it outlines most common practice and discusses the case of a more balanced funding for UASFs from different sources, looking at advantages and disadvantages of each funding source.

In [Section 5.2.2](#) the question is answered who should contribute to a UASF if an industry-levy is part of the financing source for it, and also on what revenue base the contribution should be levied.

[Section 5.2.3](#) explains how the size of UASF programme and the appropriate level of contribution from industry players is determined.

5.2.1 Sources of funds

Universal Access and Service Funds (UASFs) are generally financed from one or more of the following sources:

1. Government general budget (in a small minority of cases, including one of the first funds, Chile's Fondo de Desarrollo de las Telecomunicaciones);
2. Industry levy, as a percentage of annual revenue, on certain classes of licensed operators;
3. Various other regulatory sources such as the proceeds of license competitions, frequency spectrum auctions and fees; and
4. Once-only contributions from government, financed by loans or grants from international donors such as the World Bank, contributing seed finance to assist UASF start-up in the early years.

Most UASFs are financed mainly through annual operator levies although the legal instruments (e.g., the communications law) establishing the fund might typically name all potential sources, or be worded in an open fashion to include all possible sources.

However, a stronger case could be made that the funding should, if possible, be more balanced between the first three financing sources.

The perceived advantage of a UASF financed mainly by operator levies typically is that it is independent of available government funding, and therefore particularly attractive for low-income countries with limited resources and more pressing funding priorities. However, countries with more resources could consider contributing some amount from the government budget to the UASF. After all, the UASF implements government policy. It is important though that the UASF remains independent from day to day politics to fulfil its long-term UAS objectives, and that it continues to focus on sustainable solutions with effective and cost-efficient private sector participation. In some cases, partial government funding of a UASF might create some administrative complications, as the UASF then has to comply with government procurement rules. Another option is that the government finances the administrative overhead of a UASF, e.g. the cost of the special department of the regulator.

A strong argument can also be made that at least part of the proceeds of radio frequency auctions and licence competitions should be used to source a UASF [\[1\]](#); Guatemala's FONDETEL used this financing approach. Auction proceeds are paid by various industry players for a national resource. It typically is simply added to the government budget, but it might be more appropriate to use this money particularly for ICT development, such as to fund UAS or special measures for broadband development (e.g. increasing PC ownership or equipping schools with computer labs and broadband access).

Other sources are accumulated surpluses of regulatory fees: in 2007 the regulator in Botswana, BTA, pledged USD 1.6 million (BWP 10 million) of its surplus in regulatory fees for the use of the future UASF.

Important in all cases is the predictability, timing and the frequency of the funding to allow proper planning and constancy for the UAS implementation. Also, regardless of the financing sources, a special fund like the UASF, administered often by a department of the regulator, with stringent transparency and other requirements, appears to be a helpful instrument to implement UAS policy efficiently. In conclusion, each country can evaluate which mix of financing might be available and appropriate for the UAS policy implementation.

The contribution of multilateral and bilateral donors towards the UASF financial base is significant in the early years in some cases [\[2\]](#). This is because some institutions and donors – notably the World Bank and the UK's Department for International Development (DFID) – are strong supporters of the transparency provided by Output-based Aid (OBA) and subsidy tendering mechanisms which are favoured by many UASFs. An introduction to the OBA mechanism is provided in the Practice Note *Output-based Aid (OBA) explained*.

As described in [Section 5.4](#), a large number of other sources, including international donors, non-government and corporate organizations are also involved in financing and supporting telecommunications public access, and ICT projects and applications, individually or through multi-donor initiatives. These often encompass applications across several sectors of the economy, from education to commerce, health and governance. The investments are sometimes associated with a UASF programme, but often independent of it.

These other sources are thus complementary to UASF programmes, but also have the ability to leverage themselves through inter-agency collaborations and partnerships. This can perform a most vital role in creating the capacity for ICT user development and market emergence in otherwise very weak and non-commercial stages of development.

END NOTES

1. The following are illustrative examples of licence auction proceeds realized: Afghanistan USD 40 million for 3rd GSM licence in 2005; Bangladesh USD 50 million for 6th GSM licence in 2005; Benin USD 81 million for 5th GSM licence in 2007; Egypt USD 2.9 billion for 3rd GSM licence and 3G frequency in 2006; Ghana USD 50 million for 6th mobile licence and 3G in 2008; Mauritania USD 102 million for 3rd GSM licence in 2006; Moldova USD 8 million for 3rd GSM licence in 2006 and Panama USD 172 for the 3rd and 4th GSM licence in 2008.
2. Uganda, Nicaragua, Nepal, Mongolia and Mozambique, as well as the countries participating in the Eastern and Southern Africa Regional Communications Infrastructure Program (RCIP) are examples of World Bank and GPOBA seed financing of UASF programmes, as described in the Practice Note *Output-based Aid (OBA) explained*.

5.2.2 Industry levy – who should contribute?

Given that operator levies are generally the most common source of funding for Universal Access and Service Funds (UASFs), typically, all major operators, fixed and mobile, are required to contribute. In some cases (e.g., Uganda), ISPs and even post and courier companies have been required to contribute, even though many ISPs are still only marginally profitable and smaller ISPs often state to be unable to afford a contribution.

On balance, it is probably best to require all telecommunications and Internet service providers (including VoIP service providers) to contribute to the UASF. The matter of affordability can be addressed in a number of ways; the most practical approach may be to set a minimum size limit (e.g., annual revenue or market share [\[1\]](#)) above which a company becomes required to contribute to the fund.

Regulators and governments need to be careful to ensure equity both in the contributions levied and in the eligibility for subsidy allocations. These have at times been controversial issues, especially where mobile operators have been major contributors, while the rules of the UASF have stipulated that recipients should be fixed service providers or the technical specifications of the bidding rules were clearly geared to fixed-only solutions (see [Chapter 3](#)). Two countries with large UASFs, India and Malaysia, are examples of this type of situation, caused by UASF rules that were created before mobile telecommunications became prominent and accepted as providing basic services. UASF rules lagged behind developments in the market place and made no provision for the key role that mobile operators can and should be playing in universal access (UA) and even in universal service (US). Best practice is now pointing to the inclusion of mobile operators in UASF competitions; India, for example, now has a major universal access and service (UAS) programme of financing towers for mobile and other wireless operators in rural areas.

Whereas the best solution is to ensure that UASF regulation is flexible from the outset, the issue of change and adjustment is also discussed further in [Section 5.3.8](#) that deals with fund evaluation and adjustment of rules and targets.

END NOTES

For example, the European Union's 1998 Universal Service Directive allowed for small players (e.g. under 5% market share) to be exempt from contributing to any Fund. This is not mentioned anymore in the 2002 EU Directive, mainly because the wording has become more generic.

5.2.3 Appropriate industry contribution

As noted in [Section 3.2.2](#), operator levies typically range from less than 1 per cent of operator revenues in South Africa to 5 per cent in India and Colombia and 6 per cent on certain qualifying revenues in Malaysia.

How is the level of Universal Access and Service Fund (UASF) contribution established?

There are two ways to estimate what is an appropriate funding level for each country. These are as follows:

1. **Policy-driven approach** – Determine what scale of subsidy programme would be required to meet the country's policy objectives and time-bound universal access and service (US) targets. The total cost and subsidy estimates are compared to the total sector revenues. The percentage of total sector gross or net revenues calculated by this method becomes the high level estimate; or
2. **Market-driven approach** – Determine from a survey or assessment of operator and other stakeholder opinions, as well as from international benchmarks, what operators would accept or could afford as a reasonable contribution. Then develop the UASF programme to match this.

For many reasons, a hybrid iterative use of these methods is recommended. The main reasons for this are:

- Levies based on a policy-driven approach may be a political wish list and too costly which is not rooted in the reality of what can be achieved, or should be attempted, in a given time frame;

- The policy-driven approach subsidy programme could also require a larger than practical bureaucracy, in the form of UASF staff and programme management, than is realistic or sustainable by the industry in a liberalized market; and
- In some cases, the initial estimate of programme cost quickly becomes out of date due to the sector's rapid development (i.e., its expansion growth which in turn reduces the need for intervention and its financial growth which provides more finance than thought to the UASF), resulting in far less UASF subsidy requirement than first thought, and consequently less operator levy.

International experience indicates that no developing countries appear to have been able to disburse more than 2 per cent of sector revenues in their UASF programme. As discussed in [Section 3.2.4](#), in the major countries that levied 5 or 6 per cent, despite having established sophisticated UASF organizations, less than half of the amount collected has been allocated back to the sector in subsidies.

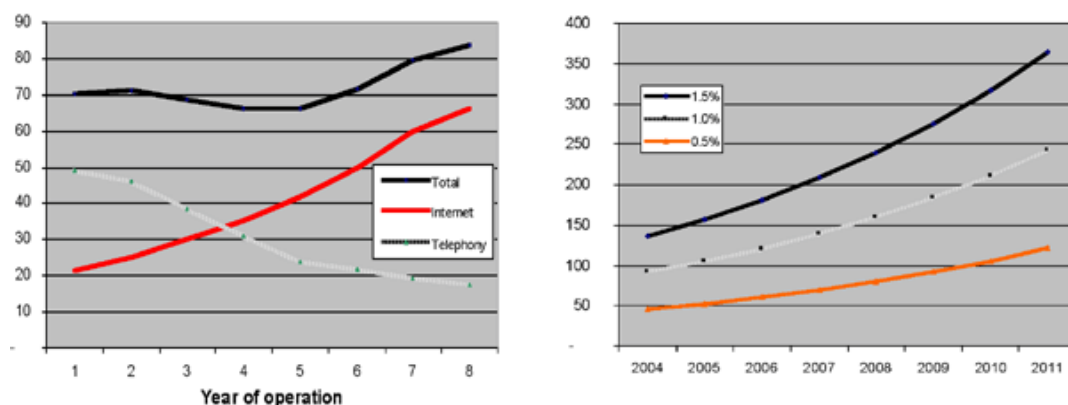
Matching programme cost (maximum subsidy) with the available resources

Universal access and service (UAS) strategists must match the size of programme to the amount available annually in the UASF. In some cases, government or an international donor seeds the fund in the early years to assist with programme start-up.

The following diagrams show the expected expenditures on the UAS programme initiated in Russia in 2004/5 compared with the options available for resources from operator levies. Three alternative percentage levy rates were based on a projection of market size over the planning years in question.

The analysis indicated that Russia's fund would need to levy 0.5 – 1.0 per cent of annual revenues from the operators in the sector to meet the goals of the UAS programme. This analysis indicated that the goals and targets for telephony and Internet/ICT roll-out were realistic both in the context of total expenditure and expected balance in the early years and could realistically be scaled back to a lower level of collection after the third year.

Figure: Financial analysis of UAS programme plans, Russia, 2004/5



Source: Intelcon analysis

Changing requirements over time

Some existing UASFs have already seen an unexpected rapid increase in financial resources during the recent period of unprecedented market growth. As noted previously in this section, some have built up resources well in excess of their capacity to organize competitions and allocate subsidies. They may even be beyond all reasonable levels of investment requirement. Thus it is important for UASF statutes to provide for evaluation, re-assessment of the levy required and (by implication) reduction of levies over time to ensure that the supply of financial resources does not run ahead of needs and capacity. This is covered in [Section 5.3.7](#).

Should levies be from gross or net revenues?

Arguments in favour of collecting levies based on net or after-tax revenues, or at least based on revenue minus required interconnection payments to other operators, are as follows:

- Avoids potential objections to what some operators would consider to be double taxation; and
- Avoids the appearance of imposing a heavy burden on new entrants, who are often taxed more heavily than early-entry operators who often have received a tax holiday. New entrants also typically face a heavier net interconnection outflow (as a percentage of total revenues) than well-established operators.

The pre-tax versus after-tax argument depends to a great extent on each country's tax regime, and whether UASF levies are classed or allowable as tax-deductible and whether subsidy receipts are also taxable in the period they are received. In general, UASF levies should be tax deductible as they represent a real cost, and subsidies received should not be taxed, as that is counter-productive to making finance available for the implementation of governments UAS policy.

For the sake of simplicity and ease (low cost) of administration, levies are best calculated on gross revenues from telecommunications services, excluding certain items easily identified (e.g., equipment terminal sales, real estate or investment income) and value added taxes.

However, some funds calculate their contributions on various formulations of net revenues, qualifying revenues, weighted revenues from various services, etc. [1]. The main objective should be to achieve the greatest transparency and efficiency in the levying process.

As discussed in detail in [Section 5.3.8](#), the level of contribution should be re-evaluated and adjusted from time to time, as UAS objectives are met or as targets are changed or the growth and revenues available in the sector change over time. The evaluation process, which includes determining levels of contribution, should be enshrined as a periodic activity under the policy in order to reflect both the achievements and performance of the UASF strategy as well as stakeholder interests.

END NOTES

1. Malaysia's Universal Service Provision Fund (USPF) levies 6 per cent of operator "weighted net revenues", which includes the following services: international calls; call termination service for foreign service providers, freephone service, ISDN, cellular mobile, international roaming, IP telephony, leased lines, other activities subject to an individual or class license. The levy secures approximately 2 per cent of the sector's total gross turnover. However it appears to be much higher than this on mobile operators.

5.3 Institutional issues: managing and organizing a UASF

As noted in the introduction of this [Chapter 5](#) as well as in [Section 3.2.3](#), there are some legitimate and understandable concerns regarding Universal Access and Service Funds (UASFs), as some have not performed as well as intended; however, closer scrutiny reveals that in most cases this is due to a lack of proper implementation and adherence to key principles of UASF management.

This section therefore surveys the range of options available when developing UASFs, their management and staffing, accountability and transparency. This is a fundamental and critical step, one which can have political as well as practical and operational impacts; it influences whether industry ultimately responds and collaborates with the government and the regulator or holds back its support. A range of specific approaches are possible, so long as fundamental requirements are respected, such as the principles of efficiency, management capacity, accountability, fairness and transparency.

[Section 5.3.1](#) to [Section 5.3.3](#) review areas of best practice that need to be considered and carefully adhered to, within the specific context of each individual country.

[Section 5.3.4](#) to [Section 5.3.6](#) ponder some questions, concerns, risks or apparent shortcomings that can occur in the administration of UASFs. No survey of UASF finance can possibly be complete without a critical look at the experience gained around the world and the possible pitfalls and limitations that have been observed. In [Chapter 3](#), [Section 3.2.4](#) Performance of funds to date, it was seen that in the period 1998-2006, only 26 per cent of UASF funds collected had been distributed to the sector on universal access (UA) projects. These sections seek to put this apparent lack of efficiency into perspective.

[Section 5.3.7](#) places both the best practice and the shortcomings of UASF operations into the context of the process of periodic evaluation and re-appraisal of UASF experience which should be enshrined in the implementation plan of a UAS policy and funding programme.

Finally, [Section 5.3.8](#) deals with the question of how UASF strategy and programming could evolve in the future as next-generation networks (NGNs) and enhanced ICT services evolve. These issues should be incorporated into forward planning under the periodic evaluation of the UASF in order to ensure that the strategy remains relevant into the future.

5.3.1 Targeting commercial viability after subsidy

The mechanism of smart subsidy competition geared to the achievement of realistic universal access and service (UAS) objectives also generally conforms to the Output-based Aid (OBA) principle introduced in [Section 5.2.1](#) and described in the Practice Note *Output-based Aid explained*.

It is crucial that UAS targets are realistic and feasible for the market so that commercial operators, with some smart subsidy support, will be able to and will want to achieve them. The objective of a smart subsidy calculation is to enable operators to bring a potentially loss-making or marginal project into a normal commercial rate of return after the one-time subsidy has been received. The subsidy thus represents an amount that bridges the operator's financing gap. It could be viewed as support to offset capital investments, capitalized operating losses for the first few years, or a combination of both. The important concept here, is that the subsidy is a once-only allocation which may be disbursed in tranches over a stipulated period of time (e.g., one to three years) corresponding to various output milestones, but is not open for re-negotiation or longer term continuation.

For an explanation of the smart subsidy principle, see [Section 1.3.3](#) Market gaps and UAS policy.

If UAS targets are unrealistic and could result in chronic and ongoing losses for the operators, then the concept of a once-only smart

subsidy is not achievable and the Universal Access and Service Fund (UASF) would have to consider ongoing support to operators to cover annual operating costs.

Successful funds have used independent demand studies to provide adequate data on which to base their UAS targets and subsidy estimates (see [Section 7.3](#)). These can also be shared with the operators who, it is hoped, will bid for the UAS projects. In fact, issues regarding what targets are reasonable and sustainable after subsidization also require industry consultation. All efforts should be made to involve the fund's key contributors in decision-making with respect to the uses of the fund, the size of levies and the subsidy strategy. This increases the chances of achieving credibility for the UASF and its management, and that operators will buy-in to the programme and willingly contribute the finances required to support it. This important part of the broader process of consultation, which is an inherent component of UAS policy development, is described more fully in [Section 4.2.6](#).

5.3.2 UASF management

This section, as well as the following [Section 5.3.3](#) describes the practices typically outlined in the Universal Access and Service Fund's (UASF's) administrative rules or manual of operating procedures. A sample outline for this kind of document is provided in Practice Note *Outline Manual of Operating Procedures* attached to [Section 4.3.2](#) Detailed regulations.

Often the national regulatory authority manages the UASF on a day-to-day basis. The two main reasons for this are as follows:

1. The regulator will have a degree of independence from government and industry; and
2. The regulator will have technical and regulatory expertise.

A UASF programme will have a greater chance of success if the regulator has a strong reputation for independence and industry trust. This is even more important if the government still has an ownership stake in any of the operators. However, it is best practice that the regulator provides the Secretariat expertise and everyday management, under a special Management or Advisory Board, which provides high-level strategic direction, approves major projects and fund disbursements, and monitors proper execution and financial integrity.

Board

All UASF's have a Board functioning above the level of the senior executive. However the Board's role differs from country to country, depending on specific local factors. The options are as follows:

- Direction or management – making executive decisions on a wide range of issues from hiring of senior managers to budgetary approval, approval of UAS programme and projects, and the final award of subsidy contracts;
- Monitoring and oversight – ensuring that the decisions of the executive (whether named director, manager or administrator) and his/her management team are scrutinized on behalf of stakeholder interests; or
- Consultative or advisory – requested to review proposed UAS programmes and projects, executive decisions, provide expertise and advice.

Whichever model is chosen as most appropriate, the Board typically comprises members providing a combination of stakeholder interests, and typically includes:

- The Ministry responsible for Communications;
- The Regulator;
- Other ministry or agency with special interest in the Internet / ICT aspects of the programme (e.g., Education, Science & Technology, etc.);
- Consumer associations (if existent);
- Industry association; and
- Special expert(s) in the fields of telecommunications and ICT without any direct affiliation to an operator.

Because of the spectrum of possible functions, there is a wide difference of opinion regarding the make-up of the board. For example, if the Board is actually responsible for the final decisions (as in the case of Peru or Nigeria), operators and service providers cannot have direct representation as this would constitute a conflict of interest. In such cases, it is still wise to have independent telecommunications experts who have experience of the commercial sector.

On the other hand, if as in the case of Mongolia, the Board's role is purely one of monitor or watchdog, there could be a rationale for having several direct representatives of industry on the Board, to ensure openness, fairness and industry satisfaction that the money it contributed is being used properly.

In cases where the regulator would not have the capacity to manage the technical, administrative or financial aspects of the fund, outsourcing to an independent private sector agency is recommended [\[1\]](#).

Staffing

In addition to a full-time Manager or Director (sometimes called the Administrator), who does the overall programme and implementation planning, the UASF should have at minimum, the following staff:

- Projects manager / Senior project manager(s);
- Technical manager & staff for field inspections;
- Research manager and data specialist(s);
- Contracts & administrative manager; and
- Finance & accounts manager (full or part-time).

The number of staff will vary depending on the size of the fund. For example, a small fund managing a programme of less than USD 15 million in the first five years, such as Uganda's or Mongolia's, will only need four to five dedicated staff, whereas others with annual potential of over USD 50 million could need two or three times the number of staff members. Some of the staff may be semi-permanently seconded from the regulator's other departments, or used on a time-share basis (e.g., the accountant's position may only require a few hours per week except during major reporting periods).

END NOTES

1. During the time the Peruvian regulator, OSIPTEL, was responsible for the UASF (FITEL), it outsourced the *financial* management to a Trust Company. Also, many UASFs to date employ outside consultants or technical auditors to undertake UAS target area development, subsidy calculation, tender management and field inspections.

5.3.3 Ensuring accountability, transparency and efficiency

This section discusses several different measures that are required to ensure the financial integrity of Universal Access and Service Funds (UASFs) [1]. These include:

- Accounting transparency;
- Independent auditing, publication and annual reporting;
- Keeping administrative costs to a minimum; and
- Efficient use of funds.

Accounting transparency

The UASF has its own separate account in a reputable bank, which is exclusively used for its purpose and not mixed with any other regulatory activities, if the regulator is the UASF administrator. The UASF therefore has also a distinct accounting system that is not linked in any way with other institutions, with government or even the regulatory body which may manage the day-to-day UASF operations. In a system that maintains separate accounting practices for the UASF, balances can be monitored, expenditures can be tracked and thus the public's trust in the UASF can be upheld.

In some countries, UASFs without proper accounting separation and standards, or where the funds are paid into a government account, have been appropriated and used for purposes other than initially intended.

Independent auditing, publication and annual reporting

The finances of the UASF should be audited annually by an independent accounting firm and the report should be presented to the requisite government authority and be published for the general public.

Also, an annual report of all the UASF's activities, its programmes, projects and plans, progress and set-backs, receipts and disbursements should be prepared, and made public.

Keeping administrative costs to a minimum

Dedicated staff should be competent but kept to a minimum. While the actual percentage of administrative overhead cost may vary from country to country, based on the size of the funds and in-country costs, it is important that this number is monitored and a ceiling is set, for example not to exceed 2-3 per cent of the total amount held by the fund per annum. However, in the first year the UASF is established, these costs may need to be slightly higher. Non-administrative costs related to project preparation, management and monitoring may also be higher, though it is wise to set a guideline for them in the rules (for example, 5 per cent of each projects' total cost). Maximum ceilings can be established by financial analysis that projects UASF fund receipts and staff and other costs.

Keeping costs manageable in Peru

An evaluation of Peru's Telecommunications Investment Fund (FITEL) was conducted in September 2003 after the Fund had undertaken several major projects. While in the early years, administrative overhead expenditure rose to as high as 2 per cent of the funds under management, this category stabilized to around 1 per cent of FITEL's cash balance (and maximum of 2 per cent of total annual levies) from 1998 to 2003.

Typically, a UASF's legitimate administrative and operational expenses should be spelled out in the operating manual, administrative rules or regulatory procedure describing the administration of the fund. The following are examples of legitimate costs and expenses:

- Salaries, emoluments, remunerative packages and allowances for:
 - UASF departmental staff;
 - Regulatory staff seconded temporarily explicitly to the UASF operation; and
 - Board members (in accordance with the provisions of the appropriate regulation);
- Office equipment, administrative and operational costs specifically and directly related to requirements of the UASF operation;
- Operational and travel expenses for the activities of the UASF Board, the UASF management and staff;
- Administrative fees associated with outsourcing contracts as allowed in the operating manual of regulation;
- Annual financial auditing by an independent accounting firm;
- Non-administrative special costs:
 - the carrying out of technical, socio-economic or demand studies directly pertinent to the development of the UASF programme and tender competitions;
 - consultancy or advisory contracts directly associated with the UASF's tender competitions;
 - the hiring an independent technical auditor or the auditing process undertaken by the UASF departmental staff to certify milestone completion before disbursement of certain subsidy tranches as per contract; and
 - the carrying out of monitoring and evaluation activities.

Additional items not covered in the agreed list should be added only with the express approval of the UASF Board. All finances should be governed in strict accordance with the rules and operating guidelines established by the Operating Manual or regulation and established budgeting practice.

If the fund is managed as a department of the regulator, the finances, including all payments, withdrawals or other financial transactions relating to the UASF, should also satisfy the regulator's requisite financial policies and regulations.

Efficient use of funds

Careful management as well as effective subsidy estimation and market mechanisms in the distribution of funds can combine to ensure that the required levy is kept to a minimum and funds are not wasted, either through inefficient administration and management or in the market place.

Uganda's 2005/06 competitively tendered subsidy process saw an average of only 61 per cent of the maximum subsidies available (in three separate competitions) used for the universal access (UA) awards. The use of a competitive tender process, after the fund manager had estimated the maximum allowable subsidy, led to efficient use of resources. The unused 39 per cent of the money allocated to this tender could be used for other universal access and service (UAS) projects. By comparison, Chile's FDT programme used 54 per cent of its allocated subsidies in its main rural telecommunications subsidy competitions (1995-2000) and Peru's FITEL programme used just 36 per cent from 1999 to 2003, thus all three subsidy programmes have been efficient and have also leveraged private investment equal to or greater than the level of subsidies granted.

Holding of investment funds

The investment and management of funds that are being held prior to distribution as subsidies, should be done in accordance with rules that govern safe and low-risk investment practices as determined by the government or laid out in the operating manual. Typically, the assets of the fund may be invested in fixed bank deposits with an approved bank, in government treasury bills and securities, or in other vehicles only in accordance with guidelines approved by its Board and openly reported in the UASF's annual report.

As noted in [Section 5.3.3](#), one possibility for proper management and disbursement of UASF funds is to outsource these functions to a respected financial trust company. This role should be openly tendered in accordance with very specific rules and regulations.

END NOTES

1. The practices of this section as well as [Section 5.3.2](#) are typically outlined in the UASF's administrative rules or manual of operating procedures. An example outline for this kind of document is provided in Practice Note: Outline Manual of Operating Procedures attached to [Section 4.3.2](#) Detailed regulations.

5.3.4 Risks of high charges and high cost UAS orientation

A few Universal Access and Service Funds (UASFs) struggled with the following two problems:

- Some UASFs were limited, by law or lack of appreciation for wireless developments, to provide financing for fixed-line universal access and service (UAS) only; fixed line expansion into remote, high costs areas has been very expensive compared to more

economic wireless options (see also [Section 3.2.3](#));

- A few UASFs set the operator levy quite high in the early days before regulatory reform and the mobile expansion led to unexpected and unprecedented growth in the sector; as a consequence, these UASFs accumulated more financial resources than needed and that they were able to efficiently distribute.

Country cases

As noted in [Section 5.2.3](#), international experience has shown that there are no developing countries that have been able to distribute more than 2 per cent of sector revenues in their UASF programme. [Section 3.2.4](#) shows that funds such as those in India, Malaysia and Colombia, that have levied 5 or 6 per cent and established relatively large UASF organizations, have managed to distribute back to the sector less than half of the amount collected. In the case of India and Malaysia, there has been only a limited universal access and service (UAS) role to date for mobile operators, even though mobile operators are often now best placed to be the carrier of UAS services. The original high levies designed to cover the cost of implementing high cost fixed line solutions, without making financial adjustments as the commercial market expanded and changed, have yielded far more financial resources than the fund managers need to meet an objective that may in fact have shrinking costs.

In the case of India, the programme of the Universal Serviced Obligation Fund has been expanded and diversified considerably in order to spend more of the resources available to it. Measures have included the financing of mobile infrastructure and it is understood that Malaysia's policy is also under review.

In 2001, Brazil established the National Telecommunications Fund (FUST), financed through a one percent operator levy. Because of Brazil's large market size, the government has been able to accumulate a large amount (USD 1.7 billion as at June 2005). The fund was created to finance telecommunications service access to low-income groups, schools, hospitals, libraries and remote locations. However, the money cannot be disbursed due to conflicting legal interpretations, largely relating to its restriction to the funding of fixed services and inability to facilitate any role by mobile services, and a lack of political will and consensus, as policymakers are the decision-makers on the use of FUST. As a result of FUST's inability to operate, the unused funds support the federal government's efforts to increase the public sector surplus or stabilize its currency through important foreign reserves, though negatively affecting the general credibility of the UASF mechanism internationally. However, Anatel managed to further UAS goals through issuing new licenses which included UAS requirements and innovative pairing of frequency spectrum tendering with UAS targets, as discussed in [Section 2.4.2](#).

A further example is South Africa's fund, which even though the levy has been only a small percentage, experienced problems in the early years. The Universal Service Agency of South Africa started with a telecentre programme in poor communities, but the majority was considered ineffective due to a combination of insufficient connectivity, management issues and sustainability problems. Also, the later approach of licensing small rural operators and providing them with grants in underserved areas is considered controversial: it underestimated the rapid progress of mobile operators in rural areas and only a handful of the rural operators are operational, struggling against the competition from mobile operators as well as dealing with lack of regulatory support. However, it is probably too early to decide whether they are successful or not, as there are some that have become Mobile Virtual Network Operators (MVNOs) for the leading mobile operators and others that provide VoIP.

South Africa's UASF has large unspent reserves; while the government is now pressing the re-organized Universal Service and Access Agency of South Africa (USAASA) to distribute available funds, it is also placing UAS obligations on new licensees in the sector as well as attaching them to new frequency holders.

In all of these cases, unspent levies represent an opportunity cost to the sector, which lowers overall economic efficiency and, ultimately, network reach.

To balance these negative experiences, as already noted, the Ugandan model became the first of several new-breed, smaller sized, less bureaucratic and technology neutral UASFs in Africa and elsewhere. These exist mostly in lower income and/or geographically challenging markets that do, in fact, need some level of intervention. The Ugandan fund, in addition to telephony tenders, also successfully held competitions for Internet POPs in every district centre in the country. Up to 2007, it has attracted more seed finance from the World Bank than it has spent from the one per cent levy on operators and, in reality, has contributed more to development of the sector and to UAS, in a challenging economic climate, than it has cost the operators.

5.3.5 Faster commercial expansion than UASF implementation pace

In Uganda, as well as in Nigeria, Mozambique, South Africa and many other countries, mobile network development has outpaced the regulator's ability to promote universal access and service (UAS). For example, due to funding and tender delays, half of the communities slated for subsidy in Uganda under the first Rural Communications Development Fund (RCDF) tender had already been reached by the leading GSM operators before tender award had been made. As well, the highly successful Village Phone model of public access had already been rolled out to more than 4,000 villages. Happily, this actually enabled the leading operator to bid the lowest subsidy and saved the World Bank (and ultimately the RCDF) almost 40 per cent of the predicted subsidy. However, because of political instability and insurgency in the north of the country, the RCDF programme had an important and relevant role to play in areas not yet served commercially.

Thus there are lessons to be learned which have shown that in many cases, the administration of a Universal Access and Service Fund (UASF) may not be sufficiently agile to actually keep ahead of the market and distribute subsidies to the most appropriate areas. This emphasizes the need for regulators and fund administrators to work closer with operators and include their roll-out plans more strongly into UAS programme planning, make special efforts to avoid areas that will be served commercially through normal market forces, and focus on the removal of hurdles to market efficiency.

Prioritise the enabling of commercial solutions

Because of the pace of development of the telecommunications and ICT industry, commercial solutions are often better, more sustainable and arrive faster than policy makers are able to anticipate and design for. Therefore policy makers, regulators and UASF managers need to be careful not to waste time and resources planning interventions for areas and basic services that would be better served without intervention.

Policy makers, regulators and UASF managers should focus attention on the following market efficiency gap measures (See [Section 1.3.3](#)):

- Regulatory measures that create an environment more conducive to competitive network expansion;
- Fiscal measures that will make services and communications hardware more affordable to low-income users; and
- Enabling activities, such as promotion and advertisement that highlight the opportunities available to people, communities and organizations to take advantage of the services offered in the competitive market.

This places the policymaker and the regulator in the leadership role in the investment environment aspect of the general trends, sector developments and tools described in [Section 5.1](#).

At the same time, the UASF manager's identification of projects for funding under the UAS programme should probably favour the less attractive, more marginal side of the smart subsidy zone than the more obvious areas that are likely to be reached soon, in recognition of the capacity of the market players to outstrip the UASF process (see [Section 5.3.6](#) following).

5.3.6 The smart subsidy zone is hard to predict

As indicated by the Ugandan example in [Section 5.3.5](#), there is some uncertainty associated with the nature and size of the smart subsidy zone (see [Section 1.3.3](#) Market gaps and universal access policy for a discussion of this concept). The question of whether there is even a need for financial intervention could be one of timing. Some areas will receive commercial service, though government would prefer that to take place ahead of the market. On the other hand, commercial service could arrive before the UAS funding programme can be implemented.

Considerations include asking how long a marginal area might remain unserved in today's dynamic and competitive mobile growth market or how likely it is that some very remote access-gap areas are to remain unreachable by conventional mobile networks. In some cases, networks deemed unviable or less interesting today and that apparently justify intervention, could become commercially viable sooner than policy makers (or even operators) had previously expected. This could be due to several factors, such as the following:

- Some areas are strategically important to an operator for the purpose of achieving competitive advantage and brand recognition e.g., along lightly populated highways or leading into tourist or agricultural growth areas;
- The application of new and more advanced technical strategies that lower the cost of the network, e.g. extended range transmission or low power consumption (both essentially lowering Opex costs), could change the fundamental economics of an area; or
- Operators may simply reach lower priority areas before a Universal Access and Service Fund (UASF) can actually tender the subsidy, due to better than expected operator performance, competitive pressure or UASF procedural delay.

Focus interventions on areas definitely needing assistance

Because of this, UASF outlays need to be focused on genuinely under-served and commercially unviable areas which would still flourish with a smart subsidy. Otherwise intervention could undermine commercial activity by subsidising one operator in an area that should be left to the market.

The fund manager's task is a challenging one. First of all, it is best to avoid subsidizing areas that could be served by one or more operators in the next two to three years. However, this information is often difficult to secure. On the other hand, the most remote areas, which are definitely in need of support, may be chronically beyond the smart subsidy zone. These areas would need ongoing subsidy; this would also require more complex administration and management. These are the areas referred to as residing in the true access gap as discussed in [Section 1.3.3](#).

Alternatively, as incorporated into Botswana's Draft UASF policy, some areas may justify temporary operational support, such as power supply subsidization or fuel subsidization, until such time as national grid electrical power supply becomes available.

It is very difficult to predict which areas will need financial support when a market is still in its rapid expansion and growth phase. UASF

managers are better able to predict the areas requiring support once a market reaches some level of maturity and shows early signs of saturation or clear signs of where the financial barriers lie.

5.3.7 Evaluation and re-appraisal of UASF operation

Considering the issues outlined in [Section 5.3.4](#) to [Section 5.3.6](#) – namely the risk of unused revenue from levies, the pace of commercial developments, the challenge presented in identifying the smart subsidy zone, and the questions about Universal Access and Service Fund (UASF) continuing relevance – there will always be the need and opportunity for evaluation and re-appraisal.

As communications markets develop and grow and as policy targets are met, adjusted or freshly crafted missions and targets are required. The amount of money needed to maintain a universal access and service (UAS) programme may not remain at the same level for very long. The Universal Access and Service Fund (UASF) programme, its orientation, and even the structure of the fund itself, should be subject to a regular strategic policy and management review, e.g., every three years. The evaluation should consider such issues as:

- The achievements of the fund against its objectives and targets;
- The development of the telecommunications market, and the role, relevance and usefulness of the UASF in meeting UAS objectives in the country;
- The collections and disbursements of the fund against projections, and investigation of reasons for departure from plans and targets;
- The costs and effectiveness of the fund's management and management structure;
- The strategic options for future development of the fund to further meet its own objectives and the fundamental ongoing UAS policy objectives for the sector; and
- The financial requirements of the fund to meet the new objectives, and recommendations with respect to future levies.

There could be a strong possibility that as the market grows and UAS targets are met, the percentage levied on operators could be reduced, unless the fund's mission and objectives (and staff size) expand considerably.

The questions related to how UAS policy and UASF strategy and programming could evolve in the future, as next-generation networks (NGNs) and enhanced ICT services evolve, are also discussed in [Section 5.3.8](#). These issues should be incorporated into the forward analysis under the periodic evaluation of the UASF, in order to ensure that the strategy remains relevant into the future.

Also, considering these required adjustments identified in evaluation and re-appraisal, it is evident that legislation on UASFs needs to be flexible – more principle-based and less prescriptive – to allow for required changes in the UASF operation to adapt to changing market and technological advances.

5.3.8 NGN, ICTs and future role of Universal Service and Access Funds

There are several developments and considerations influencing the thinking about the future of Universal Access and Service Funds (UASFs), asking the questions:

- If universal access and service (UAS) to telephony will be achieved in the near future, how relevant is the UASF model for ICT and broadband?; and
- How will the move to Next-Generation Networks (NGNs) influence the funding model of UASFs?

Changing focus to ICT

A 2006 study undertaken for the Latin American association of regulators (Regutel), concluded that Latin American UASFs funds had played an important role in network development, and identified some of the challenges as discussed in [Section 5.3.4](#), [Section 5.3.5](#), and [Section 5.3.6](#). While the study made many specific recommendations for improving, streamlining, or realigning the activities of Latin American UAS policies and UASF programmes, it also recommended consideration of a new mandate altogether for their role in the future of the telecommunications sector in the years ahead.

Since universal access (UA) to telephony is, in the opinion of the study's authors, close to being achieved in Latin America, a main feature of the study's recommendations was to consider re-orienting UASFs towards supporting "ubiquitous deployment of advanced technologies and services". The study advised that as the communications technology revolution continues, the new generation of UASFs could be envisaged to become leaders, not delayed followers, in ensuring that populations have access to the most modern and effective networks, services, and applications available on the market. This would include broadband, wireless, multi-service platforms permitting full access to all functions and features of telephony, Internet, data transmission, e-commerce, e-government, multimedia entertainment and interactive communications. These new UASFs role in promoting broadband would be through support to intermediary facilities, such as backbones (including POPs), towers and other passive infrastructure. The full account of this study and its interesting conclusions is available in the reference document *New Models for Universal Access in Latin America*.

A new generation of funds, managed by public sector administrators, is still unlikely to have the capacity to lead developments in the field

of advanced technologies and services, especially since the Latin American UASFs have faced similar challenges as referred to in [Sections 5.3.5](#) and [Section 5.3.6](#); instead, the commercial private sector is likely to continue to be the leader in technology and service innovation and service expansion, and that is in line with market-driven developments. Therefore, new UASFs may not lead but by putting emphasis on broadband can at least mirror in rural areas what the market is achieving on its own in urban areas. New UASFs, once government has agreed on an aggressive broadband promotion policy, would not wait until a large portion of the population has access to broadband to start filling in the gaps, but rather act in parallel to the market while taking care not to subsidize areas that the market would serve on its own.

Enabling and supporting ICT development

UASFs' greatest outstanding value for the medium term could be in support of Internet POPs, points of public access to the Internet, and ICT user development, as many funds are already doing. The latter will include short-term subsidization of access for vanguard institutions, such as schools, libraries, community groups and other agencies with limited resources, until the costs reduce and value to these organizations is sufficiently demonstrated for them to pay cost based prices.

Such activity should also be well measured, focused on areas and communities with potential for sustainability in the medium term, and designed to be responsive to market forces, with several types of financial instrument that respond to entrepreneurial need, while not distorting or misdirecting embryonic and still emerging markets.

NGNs, funding UASFs, and broadband

There are questions as to how UAS policy, operator responsibilities and funding might evolve in the competitive technological and service environment giving rise to the emergence of next-generation networks (NGNs). This discussion is today most prevalent in the advanced OECD countries and is seen in a major Reference Document produced in 2006 entitled, *Rethinking Universal Service for a Next Generation Network environment*.

Re-thinking roles

As noted in the referenced OECD report *Rethinking Universal Service for a Next Generation Network environment*, "in rethinking 'universal' access to the range of NGN services, a core issue is whether broadband should be part of universal service obligations (USOs)". Of course, the level of access or service considered universal in the OECD or EU will be totally different from that in developing countries. Nevertheless, the same principle will hold that: "Universal service is an evolving conceptIn an NGN environment, current funding arrangements for USOs may be unsustainable. A variety of alternative arrangements can be envisaged ranging from a tax on each telephone number to financing through general taxation revenue. They should be thoroughly assessed against a number of criteria, such as economic efficiency, equity and competitive entry as well as against current practice where the infrastructure and service providers directly fund universal service."

While the discussion in developing countries is different, some of the impacts of current developments are already being felt, or soon will be. Thus, increasingly developing countries are turning their attention to broadband Internet and ICT services, including applications, usage and capacity development in addition to pure access. The roles and responsibilities for access to advanced ICT services include a wider range of players and financiers.

In the broadband Internet and ICT realm, donors and non-government organizations (NGOs) whose roles shifted due to the rapid expansion of mobile telephony networks, focus more on applications and capacity building than on network reach. For this reason, the importance of a UASF, whose role has been mostly the provision of infrastructure and access to services, could possibly be thought of as diminishing once near-ubiquitous telephony service is achieved. That is not necessarily the case.

Globally, the IP-based broadband networks needed as platforms for ICT services may not be simple upgrades of the networks dominating the telephony market, but may be disruptive new technologies that by-pass existing networks. These could be based on optical fibre or new wireless technologies. While in OECD countries, the competition will be intense and new services may roll out relatively painlessly through a number of alternatives, this may not necessarily be so in developing countries. New broadband networks may only arrive into rural areas at a cost that is much less recoverable from the service demand than was the case for the steamrolling expansion of mobile telephony. Thus UASF models and smart subsidy concepts developed for the telephony generation may need to be adjusted to this different reality.

In summary, UASFs in the next generation could move in two main directions, namely:

- An increase in importance and role as a stimulating force for the market, piloting innovative rural service and application concepts, creating demand for advanced ICT connectivity and services (e.g. through financing broadband access for schools, more direct support of users and applications) and an enabling environment; and
- A funding mechanism for broadband networks into rural and unviable areas through support both at the retail end (e.g. shared access), as well as at the wholesale end (e.g. through intermediary network facilities such as backbones, wireless towers and other passive infrastructure).

Such re-thinking of options will be common to both developed and developing countries. For a multiplicity of reasons, therefore, a periodic evaluation and re-appraisal of the UASF, as described in [Section 5.3.7](#), is necessary to ensure that both best practice and best role of UAS policy and funding are maintained.

5.4 Other approaches to UAS funding

This section discusses the financial contribution to universal access and service (UAS) of Public-Private Partnerships (PPPs), international funding institutions (IFIs), non-government organizations (NGOs), corporate social responsibility (CSR) and philanthropic trusts, and municipal governments, amongst others.

[Section 5.1](#) General Trends in ICT development and UAS financing provided an overview of the spectrum of financiers active in the sector. It was noted that many OECD country donors, while still engaged in some bilateral ICT-specific programmes, are contributing to international multi-donor initiatives and public private partnerships (PPPs), and are also integrating ICT components into their development programmes for other sectors. Practice Note *Donor ICT for Development Programmes and Expenditures* provides a detailed summary of the activities in ICT of the 22 OECD's Development Assistance Committee (DAC) members and of the European Union and lists many of the contributions to multilateral and multi-donor initiatives supported.

NGOs and other public and private sector organizations, including technology investment trusts, philanthropic agencies, CSR programmes are also involved.

It must be stressed that in the field of telephony, these agencies' roles are usually additional to the role of Universal Access and Service Fund (UASF) funding, and are typically not an alternative to them in remote and otherwise non-commercial areas. Also, whereas voice telephony often tends to require little more than to have service coverage in place for the benefits to spread even to the poorest, additional investments in developing shared and public access vehicles prove to be very important in many situations.

In the field of Internet and ICT development, the additional activities and investments become even more critical. For instance, investments in local promotion and awareness, applications development and capacity building are vital. Without the activity of international donors, NGOs and corporate organizations, UAS to ICT services would be largely ineffective in the first instance at least.

Donor and NGO involvement in ICT development is more effective if adequately leveraged into partnerships and collaborative arrangements, which can have a broad impact on the users, communities, social groups, and on economic activities that can benefit from ICTs. In these situations, a UASF mainly plays the role of funding initial network access, e.g., an Internet POP, or access for a school or other vanguard institution, Internet café or telecentre. However, without the broader donor involvement in supporting ICT for development activities that leverage the use of these facilities, pure access may produce few benefits.

5.4.1 Public-Private Partnerships (PPPs)

Governments in both advanced and developing countries are turning to the private sector for the delivery of infrastructure services. This is additional to the cases of full-scale privatization. The reasons for new kinds of public-private partnership are driven equally from two different directions, which are:

- Recognition that private sector organizations often have superior management skills, understand the market and marketing forces, are motivated and financially efficient, even though they are driven by financial profit and may have a limited tolerance for risk in challenging situations; and
- Government has a mission and responsibility to meet social and developmental needs and service objectives which are in the public interest; it has financial resources it can invest in order to secure those objectives, and thus reduce the risk of financial failure as compared to a purely private venture.

The rationale for harmonizing these principles into projects that have a bearing on universal access and service (UAS) is not hard to see. For example, the government is keen to take steps in the development of broadband, enhanced Internet service provision and e-governance which need both private sector skills and government direction or vision and financial resources. [Section 4.1.3](#) provides relevant background to this discussion.

Definition and degree of Public-Private Partnership

Within this concept of combining the two forces into a partnership for common goals, there is a wide range of types of PPP. However, as a general concept, the following can be used as a broad definition:

A cooperative venture between the public and private sectors, built on the expertise of each partner, which best meets clearly defined public needs through the appropriate allocation of resources, risks and rewards [\[1\]](#).

The label of PPP could be applied to any project where both government and private organizations have a financial stake and the private sector is providing infrastructure or public services. A list of possible PPP models and the financial relationships involved is provided in the Practice Note Models of Public-Private Partnership.

PPPs in telecommunications and ICT

PPPs are coming into focus for a range of ICT activities, from some forms of network development (e.g., broadband), e-government and e-commerce initiatives, to some forms of application development. As discussed in [Section 1.3.3](#) and elsewhere in this module, purely private sector led development, or even Universal Access and Service Fund-style (UASF) subsidy funding may not be sufficient to reach certain areas or provide certain services, even with 'smart subsidies'. This may be especially the case where the government should take a lead in order to catalyze or enable a style of development that is not driven by commercial demand (e.g., health, education) and requires ongoing public funding. This could also include broadband backbones and the supply of transmission bandwidth sufficient to catalyze advanced ICT applications, for which demand is not yet proven. This could be a case for public-private partnership.

There are a range of potential means by which government or international public sector participation could be used to catalyze the development of broadband networks. Some of these are listed in the World Bank's "Global Public-Private Partnership in Infrastructure" web portal's section on telecommunications [\[2\]](#).

The government of Singapore, often a leader in government initiated ICT schemes, has recently announced a competitive tender for such a scheme, offering up to USD 500 million funding for a national broadband network infrastructure to carry next generation services. The network of optical fibre cables will be operated in a structurally separate manner from the operating service companies' switches and routers.

The Practice Note *Public-Private Partnerships in the telecommunications and ICT sector* provides brief descriptions of a limited number of PPPs from Canada, India, Estonia, Malaysia, Egypt, the East African Region and the World Bank's Africa Regional Communications Infrastructure Program (RCIP), where various PPP models are used to promote the development of national backbones.

Potential concerns around PPPs

A natural concern with PPPs is whether the government by entering into an agreement with an industry player, is distorting the market by backing a certain player or technology, and that PPPs are anti-competitive. The same concern applies to multi-lateral donors, and to bilateral donors who may sometimes be seen as favouring their own industry in providing development assistance.

Ways to avoid distorting the market are similar to the mechanisms universal access and services funds (UASF) often use: competitive tenders. The Singapore initiative described above is a good example for a best practice PPP, as they use a competitive tender to determine the private sector partner for their PPP. Another principle is to have, as far as possible, technology-neutral competitive tenders, or in general, focus on specifying the results and outcomes of a PPP initiative, its requirements, and provide flexibility for the private sector to develop their own proposed solution, model or approach. This avoids pre-determining the best technology, software or solution in the tender, allowing fair competition.

A final concern relates to the period after the private sector player has been selected: is the government and are customers locked in? This concern needs to be addressed at the outset, in the design of a PPP project, and has to be weighed against the desire of the private sector party to have certainty and continuity. Possible approaches to reconcile these diverging interests are the following:

- Separate various parts of the PPP project where appropriate, e.g., have one company build a backbone and another manage and operate it; this might make it easier to replace a management company later;
- Consult industry beforehand on their particular interests, and on issues of ownership, divestiture and replacement rules, and include those rules, if appropriate, into the PPP contract;
- Limit the service contract, e.g., for three, five or ten years, after which it is open whether the chosen company will continue or a new tender is conducted.

Universal access and service funds (UASFs) and PPPs

The provision of UASF funding support on infrastructure projects is, arguably, a form of PPP. Even though the funding is levied from the industry, it can be seen as a specific-purpose tax and as such becomes state property. The government, through the UASF, allocates it to sector players, which sign special contracts with detailed obligations that they would not otherwise have. The retention of even partial ownership by the government is less important than its ability to play a role in directing the behaviour of the operator.

In the case of most UASF programmes, the primary role for the host government (and/or regulator) is the analysis and setting of direction as to which targets for infrastructure development shall constitute the minimum acceptable level of coverage in telephony and ICT access and service provision, and which areas will need financial assistance to meet targets.

Hence, UASF can be considered one form of PPP, possibly a "light PPP", as opposed to other forms where government has major ownership and is involved in management.

In the case of UASF developments where the government, through loans or grants from the World Bank, has provided seed finance for piloting (e.g., Mongolia and Mozambique), or to support the first round of universal access (UA) project tenders (e.g., Uganda and

Mongolia), there is clearly a form of PPP taking place.

END NOTES:

1. Definition of PPP by the Canadian Council for Public-Private Partnerships. The website provides a range of useful material, at http://www.pppcouncil.ca/aboutPPP_definition.asp
2. The World Bank Institute's PPP portal, which is designed to assist PPP management units around the world to identify resources related to PPPs and their management is at: <http://info.worldbank.org/etools/PPPI-Portal/eLibrary2.asp?topicID=2333&T=5>

5.4.2 Municipal network alternatives and funding approaches

The emergence of municipal broadband networks provides an additional source of financing - from the municipal government - for ICT service development. There are encouraging and discouraging examples, which are described briefly below.

The Reference Document *Diversifying Network Development: Microtelcos in Latin America and the Caribbean* identifies a number of small-scale network initiatives in Latin America. Among these, the Pirai municipal network in Brazil is a successful case that commenced from the demands of the municipal authority but spread to become the cornerstone of a broader and visionary plan to diversify the local economy and attract new investments through ICT and network development. The project included e-government, education and public access, with a range of application support and development activities. Many broadband access nodes have been established connecting all local government offices and most of the public schools, libraries, and general public access points. Broader commercialized services to households and businesses were also established through a public-private company. It appears that all financing flowed first of all from the municipal government and even though a commercial enterprise was later established, it was funded and supported by the municipality. The Practice Note *Pirai municipal network* describes this case. [1]

On the other hand, several municipal Wi-Fi networks have been initiated in the USA, some with very limited success. Most of these are proving themselves to be operational failures because the cost and technical complexity of building the networks for reliable operation is high, the revenue base had been largely unproven before the plans were laid, and effective commercial relationships were either not established or, in the liberalized environment of the USA, tend to create conflicts between public and private interests.

Financial support for networks that are not built on the basis of solid demand and commercial feasibility will usually prove unviable, unless one player (such as the municipality) has limitless resources. Generally speaking, such networks should not be considered unless the municipal government is willing to pay for its development and to become the anchor tenant and thus to under-write operating costs at the start, as well as to form alliances to create vision and collaboration. This clearly took place in the *Pirai* case in Brazil, but has been lacking in most of the USA cases.

On balance, this model is difficult to use for building a strategy for the developing world unless central or local government has both the vision and resources to under-write the initial installation and first few years of operation. But even then, the relationship with private sector interests (e.g., ISPs) must be clarified and it must be proven that the establishment of municipal networks does not run counter to general market development, which must eventually take place, and the health of private sector operators.

END NOTES:

1. See also infoDev's study, "[Municipal Broadband Networks - Local Open Access Networks For Communities and Municipalities](#)".

5.4.3 Village phone, operator outreach and partnership programmes

A number of mobile operators have promoted public access to telephony and ICT as a commercial outreach to rural areas, or as non-commercial investments to develop future markets, or even under their corporate social responsibility (CSR) programmes as economic empowerment projects. From the financing perspective, it is important to note two features, namely:

1. This kind of initiative effectively participates financially in covering the costs of universal access and is sometimes directly complementary to UASF disbursements (as in the case of Uganda), while contributing to wider economic impacts; and
2. In most cases, the projects involve the provision of finance, expertise and technical assistance from international partners and donors, effectively creating public private partnerships (PPPs) to reach beyond the purely commercial market gap boundaries.

A few examples of the financial approaches and partnerships being implemented in these styles of initiative are listed below, only as representatives of a wide range of projects taking place worldwide:

- **Micro-finance bank led** – Village Phone is the generic name attached to micro-finance led public access programmes originated either through the financial involvement of Grameen Bank (i.e., the original Village Phone programme through Grameen Telecom in Bangladesh) or replicated and financed through the Grameen Foundation and its partners [1]. The World Bank Group, through the IFC and its infoDev programme, have actively supported the programme, and Africa's leading mobile operator, MTN, has been the primary

investment partner for three Village Phone replication programmes, in Uganda, Rwanda and Cameroon. The programme also offers a Replication Manual – see the reference document in Section 3.3.1 or see endnote [2].

- **Corporate Social Responsibility led** – MTN Nigeria has implemented a Rural Telephone Project (RTP) under a micro-finance scheme similar to but distinct from Village Phone, where rural and urban women, referred to as phone ladies are loaned money through Micro Finance Institutions (MFIs). Importantly, this programme has been supported financially through the company's CSR Programme, the MTN Foundation [3]. The objectives of the project are to provide GSM services in rural communities, and to alleviate poverty and empower women. The World Bank contributed to a pilot phase of this project that helped to expand the concepts from its initial start to a full-scale economic empowerment programme married to rural service outreach. Finally, the IFC, an investor in MTN Nigeria, also contributed to the planning of the final scale-up, by funding a performance assessment and feasibility study.
- **Operator led** – Telenor Pakistan has launched two programmes fitting the category of public telephony and information centres. One is called apnaPCO, which aims at bringing telephone access to the most disadvantaged rural communities in the country, and the other is a programme of community information centres, named Rabta Centres, to offer high speed Internet access to people in rural areas of Pakistan. The apnaPCO project has been set up with support from the Development Fund of the GSM Association (GSMA), the global trade association for GSM mobile phone operators.

Telenor Pakistan has also entered into an alliance with the National Rural Support Programme (NRSP) for the roll-out of the project in the most impoverished rural areas of southern Punjab. The project works on the principle of shared access to voice, a term which refers to the sharing of a mobile phone, in the form of a supervised public payphone. The Rabta Centres offer all modern communications facilities, using high-speed EDGE technology to help bridge the digital divide. The role of both these programmes from the universal access (UA) perspective is obvious, but equally important is the partnership that this provides to Pakistan's Universal Service Fund (USF). While Telenor Pakistan might be investing in future markets irrespective of USF funding, Telenor is also using its programmes, alongside subsidized network expansion, in part to fulfill obligations accepted under the USF's pilot project in the north of Pakistan. For the Rabta Centres, Telenor Pakistan is also collaborating with the GSMA Development Fund, Nokia Siemens Networks and the ILO (International Labour Organisation) [4].

- **Private development trusts and funds** – The GSMA Development Fund, which has contributed to the above example, provides a significant model where investment has been put into collaborative projects with the objectives of providing scalable examples of shared or public access to telephone and ICT services and increasing awareness of governments, regulators and policymakers to potential commercially driven approaches to UA. Projects similar to the above are being supported in South Africa, Kenya, Nigeria as well as several other African and Asian countries [5].
- **Corporate programmes and foundations** – A number of major corporate programmes can be identified that can play (or have played) significant roles in ICT development alongside UAS programmes. These include, but are by no means limited to, the Intel World Ahead Programme, which assists with building of WiMAX networks [6], and HP's e-Inclusion program, which assisted individuals and communities in education and micro enterprise business development, among others, and ended in 2005.

END NOTES

1. www.grameenfoundation.org/what_we_do/technology_programmes/village_phone
2. The Grameen Foundation replication manual is available at www.grameenfoundation.org/pubdownload/~pubid=1
3. The MTN Foundation project is described at www.mtnonline.com/MTN-Foundation/Eco-Power.asp
4. The Rabta project is described at www.telenor.com/cr/news/_articles/aktuel_t_2007050512.shtml and http://press.telenor.com/PR/200709/1155516_5.html
5. <http://www.gsmworld.com/developmentfund/index.shtml>
6. http://www.intel.com/intel/worldahead/connectivity.htm?iid=worldahead+In_connectivity

5.4.4 Collaborative initiatives financed by OECD governments

The following is a sampling of major multi-participant initiatives in ICT development which are financed or sponsored in whole or in part by OECD governments. Some of these activities, including activities of bilateral donors, are listed in the Practice note attached to [Section 5.1](#), entitled *Donor ICT for Development Programmes and Expenditures*. Most of the initiatives listed in this section promote institutional collaboration that reaches down to the community level.

DOT-COM Alliance (www.dot-com-alliance.org)

Funding is provided by the United States Agency for International Development's (USAID) Bureau for Economic Growth, Agriculture, and Trade (Office of Energy and Information Technology and Office of Women in Development), regional bureaus, and missions.

"Digital Opportunity through Technology and Communication" (DOT-COM) is an alliance of three organizations to promote ICTs for development. These organizations are:

- dot-GOV provides assessments, training and technical assistance on telecommunications and e-commerce policy and regulatory reform;
- dot-ORG provides pilots, technical assistance and institutional support to increase access and use of communication technology in

under-served areas; and

- dot-EDU provides pilots, technical assistance and institutional support for the use of ICTs in education.

The DOT-COM programme provides USAID access to 15 grantee institutions and over 75 resource partners who work on ICT-for-development issues. Each of the DOT COM groups has a prime grantee with sub grantees and resource partners. The expected value of the awards is USD 75 million over five years.

USAID Last Mile Initiative (<http://ict.usaid.gov>)

As of 2007, USAID had Last Mile Initiatives (LMI) in more than 25 countries, including Ethiopia, Ghana, Guinea-Bissau, Kenya, Madagascar, Malawi, Mali, Mozambique, Nigeria, Rwanda, Sao Tome e Principe, Sudan. Tanzania, Uganda and Zambia.

USAID's Last Mile Initiative is a global programme to expand communications access for the rural poor in USAID presence countries. The initiative was launched in April 2004 to help increase productivity and improve the prospects of rural organizations in areas underserved by telecommunications networks. The programme is administered by the Economic Growth, Agriculture, and Trade (EGAT) Bureau and supported by budget resources from all the regional bureaus. The Last Mile Initiative provides technical assistance of private telecom service providers (where possible) working with wireless and other information technologies to provide telecommunications, Internet, and ICT services in underserved rural communities.

International Development Research Centre (IDRC) (www.idrc.ca)

The IDRC is a crown corporation created by the Parliament of Canada to help developing countries use science and technology to find practical, long-term solutions to the social, economic, and environmental problems they face. The support programme, which supplements that of the Canadian International Development Agency (CIDA), is directed toward creating a local research community whose work will build healthier, more equitable, and more prosperous societies. Among the many projects in the telecommunications and ICT field financed by CIDA, was the original baseline research and consultancy that assisted the government of Uganda to establish its universal access and service (UAS) policy and to operationalize the Rural Communications Development Fund (RCDF).

IDRC' Acacia initiative (www.idrc.ca/acacia/) supports Canada's contribution to the African Information Society Initiative (AIS). Acacia works with African partners to help countries apply ICTs that improve livelihoods, enhance social service delivery and empower citizens while building the capacity of African researchers. Acacia funds research and pilot projects that focuses on appropriate applications and technologies, infrastructure, policy, and governance. The funding is not typically used to finance the construction of ICT networks or facilities. Acacia provided USD 23.7 million in funding for the period 2006-2007.

International Institute for Communication and Development (IICD) (www.iicd.org)

The IICD is an independent non-profit foundation, established by the Netherlands Minister for Development Cooperation in 1996. Its funding sources are the Dutch Directorate-General for Development Cooperation (DGIS), DFID and the Swiss Agency for Development Cooperation. IICD specialises in ICTs for development. IICD creates solutions using both modern media (such as computers, Internet, email and multimedia) and traditional media (such as radio and television) to connect people and enable them to benefit from ICT. IICD is active in Bolivia, Burkina Faso, Ecuador, Ghana, Jamaica, Mali, Tanzania, Uganda and Zambia in education, environment, governance, health and agriculture.

In 2006, organizations and NGOs working at the community level accounted for 51 per cent of IICD's partners. In the private sector, IICD partners include small enterprises, such as farming cooperatives or small ICT training centres. Within governments, the national sector ministries are often local partners. By the end of 2006, IICD supported more than 130 project and policy processes, of which 30 per became self-supporting, while 60% continue with IICD support. Only 10 per cent could not be sustained. IICD's country programmes are currently reaching over 250,000 end-users. End users are people who now have access to the Internet or a computer.

The European Development Fund (<http://europa.eu/scadplus/leg/en/lvb/r12102.htm>)

The European Development Fund (EDF) is a EUR 13.5 billion fund for African, Caribbean and Pacific (ACP) countries and for overseas countries and territories (OCTs) associated with EU member states. The fund began operations in 1959. Each EDF programme is designed for five years.

The tenth EDF covers the period from 2008-2013 and provides an overall budget of EUR 22.7 billion. Of this amount, EUR 21.9 billion is allocated to the ACP countries, EUR 286 million to the OCT and EUR 430 million to the Commission as support expenditure for programming and implementation of the EDF. The amount for the ACP countries is divided accordingly: EUR 17.7 billion to the national and regional indicative programmes, EUR 2.7 billion to intra-ACP and intra-regional cooperation and EUR 1.5 billion to investment facilities. Approximately EUR 4.0 billion will be available on an annual basis for Sub-Saharan Africa under the 10th EDF.

In December 2007, an agreement between the European Commission and the International Telecommunication Union (ITU) was signed with regard to implementation of an Action entitled "Support for the establishment of harmonized Policies for the ICT market in the ACP," a component of the ACP-Information and Communication Technologies (@CP-ICT) Programme financed by the European Commission (EUR 20 million from the 9th EDF).

This Action will address the regulatory challenges facing the beneficiary countries in sub-Saharan Africa, the Caribbean and the Pacific Island States through three separate regional projects. The goal is to create a regulatory environment conducive to massive investments in

ICT infrastructure and ICT-enabled applications which the countries will adopt for day-to-day use in their economic and social activities. It also fulfils the needs expressed by the beneficiaries concerned in the domain of capacity building on ICT policies and regulations and e-readiness.

As part of the agreement, the European Commission has allocated EUR 8 million from its 9th EDF, to which the ITU has added USD 500,000 from its ICT Development Fund (ICT-DF). The Action will be managed and implemented by the ITU in close collaboration with relevant regional organizations.

The three ACP projects build on an initial project funded by the European Commission and ITU to create a harmonized regulatory framework for 14 West African nations. In January 2007, 14 West African heads of State adopted as Supplementary Acts, a series of regulatory guidelines and decisions on key regulatory issues such as licensing, interconnection, numbering, spectrum management, universal access as well as model ICT legislation and policy. These decisions are now being transposed into national law in the region. (<http://www.itu.int/ITU-D/treg/projects/itu-ec/index.html>).

The Commonwealth Development Corporation (CDC) (www.cdcgroup.com)

CDC's sole shareholder is the UK's Department for International Development (DFID). The CDC provides capital on a commercial basis in countries where businesses have difficulty accessing finance. All profits are re-invested in funds in emerging markets. CDC has received no government capital for a decade. In 2003, its investment in the telecommunications, media and technology sector was approximately 10 per cent of its portfolio, about GBP 111 million. Investments included mobile operators Celtel and Digicel.

CDC has net assets of USD 2.8 billion. They aim to make at least 70 per cent of their investments in countries with per capita GNI less than USD 1,750, and the remaining 30 per cent in countries with per capita GNI less than USD 9,075. CDC targets at least 50 per cent of their investments in sub-Saharan Africa and South Asia. As of the end of 2007, the fund had GBP 53.3 million invested in the telecommunications sector in Africa. African investments included Moga Holdings of Algeria and mobile operator MTN Côte d'Ivoire. As of the end of 2007, the fund had GBP 6.2 million invested in the telecommunications sector in Asia.

Private Infrastructure Development Group (PIDG) (www.pidg.org)

The Private Infrastructure Development Group (PIDG) is a multi-donor group founded in 2002. PIDG seeks to address the shortfall in infrastructure provision in developing countries through encouraging private sector participation. PIDG members include: DFID, the Swiss State Secretariat for Economic Affairs (SECO), the Netherlands Ministry of Foreign Affairs (DGIS), the Swedish International Development Cooperation Agency (Sida), the World Bank, the Austrian Development Agency (ADA) and Irish Aid. The PIDG works through a number of facilities, such as:

- **InfraCo** - A privately managed infrastructure development company. It acts as an honest broker to create viable infrastructure investment opportunities which balance the interests of host governments, the national and international private sector and providers of finance. InfraCo aims to stimulate greater private investment in African and Asian infrastructure development by acting as a project developer, focusing on lower income countries. InfraCo funds early stage, high risk costs by taking an equity stake in the project. InfraCo will consider investments in the telecommunications sector, but has not yet invested in the sector;
- **Technical Assistance Facility (TAF)** - The overall objective of TAF is to enhance the ability of public and private sector clients to attract private capital to the financing of infrastructure and related services. TAF achieves this through assisting PIDG clients to evaluate, develop and/or implement risk mitigation, financial and regulatory mechanisms, standards, systems and procedures essential to raising funds in the capital markets. This will enable developing countries to make a strong and positive contribution to growth and poverty reduction. TAF grants are for studies, technical assistance, consultancy services and training to facilitate in country development and/or project implementation. TAF was established in 2004 and has USD 3 million per annum in funding; and
- **Emerging Africa Infrastructure Fund (www.emergingafricafund.com)** - The Emerging Africa Infrastructure Fund (the Fund) is a public-private financing partnership initiated by the Private Infrastructure Development Group (PIDG). Following a competitive tender to the private sector, the Fund was launched in 2002. The Fund provides long-term debt or mezzanine finance on commercial terms to finance the construction and development of private infrastructure in 45 countries across sub-Saharan Africa. EAIF is able to provide between USD 10 million to USD 36 million to telecoms, transport, water and power sector projects, amongst others. Loans offer terms of up to 15 years. Loans are provided without the need for political risk cover. The fund has USD 365 million in resources.

In the telecom sector, EAIF has funded a number of mobile operators (MTN Nigeria, Celtel Africa, Celtel Nigeria) and provided a total of USD 100 million in funding. The EAIF provided also USD 35 million debt financing to the USD 600 million Seacom project - an undersea fibre optic cable project along the east coast of Africa. The project closed in November 2007 and involves the construction of a 15,000 km cable connecting South Africa to India, via France, Egypt, Mozambique, Madagascar, Kenya and Tanzania.

5.4.5 World Bank and other International Finance Institutions

This section highlights World Bank Group organizations or initiatives and International Finance Institutions (IFIs) particularly involved in the financing of telecommunications and ICT, and the complementary support of universal access and service (UAS) projects.

World Bank (www.worldbank.org)

The World Bank Group is the largest multi-lateral financier and provider of policy advice in the field of ICT in developing countries. Over the past five years, the World Bank Group has provided more than USD 3 billion of funding in over 80 countries through its three financing arms; the World Bank, the International Finance Corporation (IFC), and the Multilateral Investment Guarantee Agency (MIGA):

The World Banks' mission is global poverty reduction and the improvement of living standards. The World Bank is made up of two unique development institutions owned by 185 member countries—the International Bank for Reconstruction and Development (IBRD) and the International Development Association (IDA). The IBRD focuses on middle income and creditworthy poor countries, while IDA focuses on the poorest countries in the world. Through IBRD and IDA low-interest loans, interest-free credit and grants are provided to developing countries for education, health, infrastructure, communications and many other purposes.

The Global Information and Communication Technologies Department (GICT) is a joint department of the World Bank and the International Finance Corporation (IFC), and promotes access to information and communication technologies in developing countries through policy and regulatory expertise and leveraging private sector finance.

The World Bank has supported reforms in over 80 client governments and provided approximately USD 750 million in loans for ICT related projects. This support is in addition to lending projects in other sectors—such as health, education, trade, and finance—that have ICT components. Trust funds administered by the IBRD have contributed an additional USD 50 million to the ICT sector in the past five years.

MIGA, as an agency that provides political risk insurance to foreign investments in developing countries, has supplied an additional USD 700 million to the ICT sector through private investment guarantees. ICT is one of the best performing sectors in the World Bank Group's portfolio, both in terms of returns and development impact.

International Finance Corporation (IFC) (www.ifc.org)

The IFC has been established to foster sustainable economic growth in developing countries by financing private sector investment, mobilizing capital and providing advisory services. In partnership with private investors, IFC provides loan and equity finance for business ventures in developing countries and helps expand their economies and create jobs. As a member of the World Bank Group, IFC coordinates its activities with the International Bank for Reconstruction and Development, the International Development Association and the Multilateral Investment Guarantee Agency, but it is legally and financially independent. Its 179 member countries provide its share capital and collectively determine its policies. The Global Information and Communication Technologies Department (GICT) is the joint department of the World Bank and the International Finance Corporation (IFC).

The total of IFC's commitments to telecommunications was USD 1.4 billion by the end of 2007, and includes mobile and fixed-line operators, broadband and cable TV infrastructure, satellite, and broadcasting. Investments typically range from USD 5 million to 150 million. IFC is able to finance from its own funds up to 25 per cent of total project cost for new projects and up to 50 per cent for expansion projects.

Additionally, through its syndicated loan program, the IFC offers commercial banks and other financial institutions the opportunity to lend to IFC-financed projects that they might not otherwise consider. These loans have contributed another USD 1 billion toward the sector.

Starting in 2008, IFC expects that their new projects will enable an additional 12.2 million people to be connected, create 1,800 new skilled jobs in the IT and media sectors, and contribute a total of USD 2 billion in fiscal revenues and license, spectrum, and numbering fees over the next five years. IFC's portfolio, with outstanding commitments of USD 970 million, has seen no loan defaults and strong rates of return across the board in telecommunications, IT, and media. IFC has financed telecommunications projects in Afghanistan, Albania, Bangladesh, Cameroon, the Dominican Republic, Ghana, Haiti, India, Jamaica, Lao PDR, Maldives, Morocco, Nigeria, Pakistan, Paraguay, Peru, Romania, Russia, Sri Lanka, Thailand and Turkey.

Public-Private Infrastructure Advisory Facility (PPIAF) (www.ppiaf.org)

The Public Private Infrastructure Advisory Facility (PPIAF) is a multi-donor facility managed by the World Bank. It provides small technical assistance grants to developing country governments to help them improve their infrastructure services through public-private partnerships. PPIAF funds are grants provided on a demand-driven basis. About half the grants are under USD 75,000, while the average size of a PPIAF grant is USD 215,000.

The Public Private Infrastructure Advisory Facility (PPIAF) advises developing countries on improving the enabling environment for private sector participation in infrastructure. Through its Sub-National Technical Assistance Program, PPIAF helps sub-national entities (government entities other than national governments) borrow to improve infrastructure. Telecommunications accounts for about 9 per cent of PPIAF's budget since its inception. From 1990 to 2006, PPIAF facilitated investments over 750 telecommunications projects. For 2007, activities funded in the telecommunications sector amounted to USD 2.4 billion, or 14 per cent of total funding. PPIAF financed telecom projects in Liberia, Sierra Leone, South Africa, Sudan, Pakistan, China, Indonesia, Sri Lanka, Armenia and Haiti.

The Global Partnership for Output-Based Aid (GPOBA) (www.gpoba.org/index.asp)

GPOBA was established by the World Bank and the UK's Department of International Development (DFID) in 2003 to design pilot projects for OBA approaches, learn lessons, and disseminate best practice. DFID approved GBP 6.8m from 2003 to 2006. In 2005, DFID approved also a GBP 20 million Challenge Fund, to allow GPOBA to expand the scope of its activities to include funding of subsidy payments for pilot tests

of OBA approaches in the infrastructure sectors. The IFC joined GPOBA as a donor, focussing their funds on projects in the infrastructure, health and education sectors that involve the private sector. The Netherlands government joined GPOBA with funding to support the provision of performance based grants for the delivery of basic services to the poor, particularly in the water and sanitation sector in Sub-Saharan Africa. The Australian Government Overseas Aid Agency (AusAID) and the Swedish International Development Cooperation (Sida) also joined as donors.

GPOBA has funded telecommunications projects in Bolivia, Cambodia, Guatemala, Indonesia and Mongolia. As well, GPOBA funded a Regulatel study on UAS in Latin America, and a study of ICT development in the Asia Pacific region. The total funding provided by GPOBA for these projects was approximately USD 8.9 million.

See also the practice note attached to [Section 5.2.1](#), entitled Output-Based Aid explained.

infoDev (www.infodev.org)

infoDev is a global development financing program, coordinated and served by the Global ICT Department (GICT) of the World Bank, one of its key donors and founders. infoDev's disbursements (typically less than USD 10 million per annum) is used mostly for commissioning studies, research and pilots. Its role is mostly as a neutral facilitator of dialogue, and as a coordinator of joint action among bilateral and multilateral donors—supporting global sharing of information on ICT for development (ICT4D), and helping to reduce duplication of efforts and investments. infoDev also forms partnerships with public and private-sector organizations who are innovators in the field of ICT4D.

One focus area for infoDev is “Access to ICT – Broadening the reach and affordability of ICTs”. Currently, infoDev's work in this area focuses on three interrelated challenges:

- Designing and implementing effective policies and regulations for ICT infrastructure and services;
- Developing new models of public/private partnership in financing the expansion of access to ICT infrastructure and services; and
- Exploring the contributions that technological innovation can make to developing new solutions to the access challenge.

European Bank for Reconstruction and Development (www.ebrd.com)

Established in 1991, the European Bank for Reconstruction and Development (EBRD) was initially aimed at helping communist countries in central and eastern Europe and ex-soviet countries in their transition to market economies, and supporting new private sectors in democratic environments. Today the EBRD extends its tools of investment to help countries from central Europe to central Asia similarly. The EBRD's main aims in the telecommunications sector are the following:

- Promote network expansion, thereby increasing access to telephone services and improve the quality of service;
- Encourage the emergence of innovative and advanced communication services;
- Accelerate the privatisation process; and
- Develop appropriate regulatory and legal frameworks.

The EBRD is the largest single investor in central and eastern Europe and the Commonwealth of Independent States (CIS). Direct investments generally range from EUR 5 million to EUR 230 million. Smaller projects are financed both directly by the EBRD and through financial intermediaries.

European Investment Bank (www.eib.org)

Created in 1958, the European Investment Bank (EIB) is the long-term lending bank of the European Union (EU). While the main task of the Bank is to contribute towards the integration, balanced development and economic and social cohesion of the EU Member States, it also makes telecommunications investments in developing countries and emerging markets such as Angola, Brazil, Colombia, Ecuador, Peru, Syria and Turkey.

The EIB is expected to play an increasing role in the EU policy to reduce the “broadband gap” by encouraging private sector investment in broadband infrastructure. The investment requirements for next generation networks are potentially large, and the EIB is supporting the establishment of alternative broadband access platforms, including wireless technologies.

Inter-American Development Bank (www.iadb.org)

Established in 1959, the Inter-American Development (IDB) Bank provides financing, policy advice, research, and technical assistance for development projects in 26 Latin American and Caribbean countries. In 2007, the bank made loans and guarantees of USD 2.1 billion in the transportation and communication sector. The IDB addresses telecommunications access through a number of activities, including the following:

- Project financing in the area of information and communication technology facilitated by the Information and Communication Technology for Development Division (ICT) of the IDB;
- Supporting universal broadband access through investment to expand local Internet access networks using the Multilateral Investment Fund; and
- Assisting public, private and mixed-capital entities in the identification, development and preparation of bankable infrastructure projects through the Infrastructure Fund (InfraFund) because the IDB identified the lack of funding for project preparation as a major bottleneck for the much-needed scaling up of infrastructure investment in the region.

African Development Bank (www.afdb.org)

The African Development Bank (ADB) is a regional multilateral development finance institution engaged in mobilising resources towards the economic and social progress of its regional member countries.

Approvals for infrastructure projects in 2007 reached a record level of UA 1.9 billion, accounting for 75 per cent of the total loan and grant approvals for the year. 48.2 percent was allocated to power supply projects; 39.2 percent to transportation; 11.0 percent to water and sanitation; and 1.7 percent to information communication and technology (ICT) projects. The East African Submarine Cable System (EASSy) is of interest to the Bank's private sector operations. In 2007, the Bank's total cost for the EASSy project was USD 51.4 million, which included a USD 9.5 million loan.

The Connect Africa Initiative is a global partnership launched in October 2007 to mobilize the human, financial, and technical resources needed to bridge major gaps in ICT infrastructure across the continent. A total of USD 55 billion (UA 34.08 billion) has so far been pledged for the development of infrastructure and services necessary to achieve both the ICT-related MDGs and the World Summit on Information Society Action Plan. The ADB will play a leading role in the coordination of this initiative.

Asian Development Bank (www.adb.org)

Established in 1966, the Asian Development Bank (ADB) is an international development finance institution, owned and financed by its 67 members, of which 48 are from the region and 19 are from other parts of the world. ADB's mission is to help its developing member countries reduce poverty and improve the quality of life of their people.

ADB provides assistance in the form of equity, loans and guarantees, as well as complementary financing scheme for infrastructure projects. Examples of ADB involvement in ICT is its financing of the nationwide expansion and upgrading of Afghanistan's leading cellular network operator, Roshan, and its financial support to help prepare Assam (India) for e-governance.

5.4.6 Non-government & philanthropic sources

Most of the focus of non-government assistance is on a specific sector of activity, e.g., e-health or e-education for rural and poor people. As noted in [Section 5.1](#), the role of most of these agencies in universal access and service (UAS) development is one of applications development and user and institutional capacity building. Without these complementary and supportive activities, the benefits of having access to the Internet and to ICT services, which UAS programmes provide, would go largely unrealized.

Digital Freedom Initiative (www.dfi.gov)

The Digital Freedom Initiative (DFI) is a partnership among US federal agencies, industry, NGOs and universities. It aims to expand connectivity around the world, particularly by helping developing nations utilize ICTs for economic development and to broaden social and economic benefits. Areas of focus include:

- Improved rural access to telecommunication services in rural and under-served areas;
- Policy and regulatory reform, and technical assistance to support infrastructure investment;
- The use of ICTs by small and medium-sized businesses;
- Expand use of technology in health care, education, and for secure financial transactions;
- More inter-regional commerce and export competitiveness through use of ICTs.

Recent DFI initiatives include a public-private partnership to bring telemedicine services to rural areas in Pakistan. Completed projects include: ICT skill training for private entities in Senegal; and, working with Intel, Cisco, Motorola, Voxiva and Hewlett Packard to supported Peru's effort to extend Internet access to over 1,000 rural areas.

Grameen Foundation (www.grameenfoundation.org)

As described in Section 5.4.3, Grameen Foundation is a non-profit organization that combines microfinance, technology, and innovation to empower the world's poorest people to escape poverty. The organization was founded in 1997 by a group inspired by Dr. Muhammad Yunus and Grameen Bank in Bangladesh. The Foundation's network of microfinance partners has impacted an estimated 16 million lives in 22 countries across Asia, Africa, the Americas, and the Middle East. Dr. Yunus is also a founding and current member of Grameen Foundation's board of directors. In terms of support for ICT programmes, Grameen Foundation's Technology Center is involved with ICT initiatives that are dedicated exclusively to advancing microfinance. The Foundation focuses on increasing the efficiency of microfinance institutions' operations, creating new microbusiness opportunities for the poor and providing telecommunications access for the world's rural poor.

Building on the successful Grameen village phone programme in Bangladesh (see [Section 3.3.1](#) for details), the Uganda village phone programme was created in cooperation with mobile operator MTN Uganda in 2003. In 2006, after a yearlong pilot project with 50 entrepreneurs, village phone Rwanda was created as a joint venture between Grameen Foundation and MTN Rwanda. Grameen Foundation has also partnered with Nokia to make a village phone equipment kit available for purchase in developing countries.

Bill & Melinda Gates Foundation (www.gatesfoundation.org)

The foundation partners with select countries to provide free access to computers and the Internet in public libraries. Their strategy has three elements:

- Identify country partners through extensive research—countries are invited to partner based on several criteria, including demonstrated need, the presence of a strong library system, necessary infrastructure (such as electricity and Internet capability), demonstrated commitment to public access to technology, and the potential for implementing and sustaining service.
- Provide resources—these include resources for planning, hardware, training, advocacy, evaluation, technical support, and project management. Microsoft donates software if the country requests it. Each country is asked to commit to the programme as a full partner, requiring them to make a significant investment for infrastructure, librarian salaries, and Internet connectivity; and
- Encourage sustainable programmes—the foundation works with grantees to develop library-based technology services that can be valued and supported for the long-term.

Grants include, but are not limited to, the following (examples only):

- BiblioRedes: Abre tu Mundo – USD 10 million to provide more than 2,150 computers, Internet access, and training to 368 public libraries in Chile (2000-2004); this grant brought the percentage of public libraries with computers from 10 to 100 per cent;
- Consejo Nacional para la Cultura y las Artes – USD 30 million to provide computers, Internet access, and training to approximately 2,400 libraries in Mexico (2002-2006); and
- Latvia – USD16.2 million to connect 3,833 new computers in 874 public libraries to high-speed Internet, to expand access in rural Latvia, and for related training for 1,455 librarians.

Aga Khan Fund for Economic Development (AKFED) (www.akdn.org/agency/akfed_indpromo.html)

AKFED is mainly an investment fund dedicated to promoting entrepreneurship and building economically sound enterprises in the developing world and works with governments, international corporations, international financial institutions and donors to create solutions to infrastructure needs, including power generation and telecommunications. AKFED has existed since 1960 and creates profitable companies in developing countries through long-term investments. Profits generated by the Fund are reinvested in other economic development initiatives under the AKFED umbrella.

AKFED operates as a network of affiliates with more than 90 separate project companies employing over 30,000 people, with annual revenues in excess of US\$1.5 billion. The Fund is active in 16 countries in the developing world: Afghanistan, Bangladesh, Burkina Faso, the Democratic Republic of the Congo, India, Ivory Coast, Kenya, Kyrgyz Republic, Mali, Mozambique, Pakistan, Senegal, Syria, Tajikistan, Tanzania and Uganda.

AKFED's initial involvement in building telecommunications infrastructure was in Indigo, a GSM operator in Tajikistan. In Afghanistan, AKFED determined that building communication infrastructure was critically important to the redevelopment of the country and formed the company Roshan, which was awarded the country's second GSM license. Roshan has invested over USD 338 million in expanding its coverage. Roshan directly employs over 900 people; indirectly, nearly 20,000 people are employed through distributors, contractors and suppliers.

Dhan Foundation (www.dhan.org)

Development of Humane Action (DHAN) Foundation was initiated in India in 1997. The Trust has the objective of bringing highly motivated and educated young women and men to the development sector. The Foundation works towards bringing significant changes in the livelihoods of the poor. The DHAN Foundation has taken up information technology for the poor as a new theme with the following objectives:

- Making IT accessible to the poor by developing relevant programmes through research and pilot projects; and
- Collaborating with research institutions on e-governance and computer education at schools in rural areas.

As part of the programme, Village Information Centres (VICs) in rural areas as well as urban slums are set up through which services such as computer education, e-mail, ePost, agricultural market intelligence, etc. are rendered. Computer aided adult literacy centres for the Kalanjiam and Vayalagam members and computer training centres for the children of members of Kalanjiam and Vayalagam are also set up through the programme. By the end of 2006, the Foundation was involved in IT activities in 162 villages in 11 districts.

One Lap-Top per Child (OLPC) initiative

Started in 2005 by faculty and researchers at MIT's Media Lab, the One Lap-Top per Child (OLPC) initiative aims to provide children worldwide with new opportunities to explore, experiment and express themselves. The One Laptop Per Child Association is a non-profit organization set up to manage the creation of an affordable educational device for use in developing countries. OLPC is funded by a number of sponsor organizations, including AMD, Brightstar Corporation, eBay, Google, Marvell, News Corporation, SES, Nortel Networks, and Red Hat. Each company has donated two million dollars.

The OLPC Association's XO laptop was designed to be flexible, low-cost, power-efficient and durable. It uses free and open-source software. The XO, originally intended to cost USD 100, ended up costing USD 188, mainly because little or no large quality purchases were forthcoming from governments as expected. The first production units were delivered in December 2007. In May 2008, a new design concept was revealed that eliminates the computer's keyboard and is targeted to cost just USD 75 when it is released in 2010.

Eleven countries have participated in OLPC pilot projects. Countries participating in the project (not pilots) include Afghanistan, Cambodia,

Colombia, Ethiopia, Haiti, Mexico, Mongolia, Rwanda and the United States. Approximately 370,000 laptops had been shipped by July 2008. In total, there have been over one million XOs either shipped or ordered.

6 UAS Programme Development and Prioritization

This chapter presents and discusses some of the main steps to develop a universal access and service (UAS) programme, including an ICT sector review, demand analysis, subsidy estimation, and also a discussion on measuring economic impact and benefits and how this may help to prioritize programme components and individual projects.

[Section 6.1](#) expands on the sector analysis already outlined in the UAS policy chapter ([Section 4.2.1](#)) which helps to ascertain the country's current UAS status and answer the question: What areas and population groups do not yet have affordable access to ICT services? This results in a detailed identification of service gaps in the country; the section then looks at quantifying the demand for various ICT services in those areas that are unserved, as well as qualifying the demand, e.g., at what price point and for which level of service is there a need or a demand? Both desk-based and field demand study methodologies are presented. The purpose of this step is to:

- Identify which areas (regions, provinces, districts etc..) of the country are to be included into the UAS programme;
- Identify which ICT services are required in each of these areas; and
- Quantify the demand for those ICT services, to be used to model potential revenues, which in turn helps to prioritize projects within the UAS programme.

With the groundwork laid in identifying unserved communities and quantifying their demand, [Section 6.2](#) then looks at determining how much it will cost to provide UAS services. It further looks at what subsidies are required by comparing revenues against costs. Approaches to modelling costs, assessing viability and estimating subsidy requirements are also presented.

[Section 6.3](#) discusses the status of economic impact analyses, measurements and findings, separate for communications projects and broadband Internet & ICT service development. While these broader economic impact studies may not be well suited for the purpose of UAS programme development or prioritization, their understanding and knowledge of the latest research in this area provides nevertheless crucial information for any UAS programme planner.

[Section 6.4](#) then looks at practical approaches to project prioritization in the context of UAS programme development.

Given the dynamic nature of the communications market, and the increasing number of players, collection and analysis of the data required to perform some of the above analyses may be quite challenging.. A UAS programme developed two years ago, for example, may already be partially obsolete.

It is therefore recommended that regulators have a designated UAS department that regularly monitors, collects and analyze data on an annual basis. In addition, regulators need to maintain close and continued co-operation with the ICT industry in developing and updating UAS programmes.

6.1 ICT Sector Analysis and Assessing Demand

The first step towards developing a universal access and service (UAS) programme is to determine the country's current UAS status. The country's unserved communities and/or regions need to be identified and their demand for services assessed.

This can be accomplished through an ICT sector review, described in [Section 6.1.1](#), which includes policy issues and market players, stakeholder consultations, near-future plans (e.g., one to three years) with regard to existing infrastructure, and that may be complemented with a demand study. This enables the regulator to identify and design feasible UAS targets that can built upon the existing strength and potential of a country and leverage the capacities and synergies of market players and stakeholders already active in the market.

The ICT sector review may allow other development players to identify effective strategies that might not need high-end technology and bandwidth. For example, if a country has an active health-related NGO that wants to reach the rural population, it might use a combination of an FM radio station for information dissemination and add call centre and information retrieval services for call-in and 'question and answer' services. Uganda's success at lowering the rate of HIV/AIDS infection within the country is partly attributed to a campaign that uses radio to educate and raise awareness of HIV/AIDS issues, particularly with teenagers and other at-risk citizens, via radio-talk shows [\[1\]](#).

When implementing a UAS strategy, governments or regulators like to have a demand study undertaken that identifies consumer needs, preferences and demand for service. This can also be used to highlight the social and economic impacts of new service provision into formerly underserved areas.

For telephony services, the simplest initial desk-based demand estimate can be made in terms of the call-generating or purchasing power of specific areas or administrative units. The most common approach for estimating demand is establishing the individual household expenditure on communications, as described in [Section 6.1.2](#). In addition, for telephony, there is also demand and revenue potential for incoming calls to as of yet unserved areas which should be included in this desk-based demand estimation, as described in [Section 6.1.3](#).

For Internet services, an initial demand scenario can be created based on estimates due to the presence of administrative, business or institutional structures, as illustrated in [Section 6.1.4](#). The demand scenarios can be based on different assumptions, creating conservative, moderate and optimistic demand scenarios, and include a sensitivity analysis.

However, in order to confirm or refine these desk-based demand estimates, it is recommended to undertake field demand studies where actual users and potential users of ICT services are interviewed about their needs, affordability and other topics, as explained in [Section 6.1.5](#).

END NOTES

1. See for a practical guide The Essential Handbook – Radio and HIV/AIDS: Making a difference, A guide for radio practitioners, health workers and donors by Gordon Adam and Nicola Harford

6.1.1 ICT sector review

To prepare for an ICT sector review, which is required both for policy and programme development, statistical and other country data (e.g. socio-economic, cultural) needs to be collected and compiled to summarize the country's geographic, political, economic, social and cultural characteristics, in addition to ICT data. Regional population, geographic, topographic, demographic, and socio-economic indicators that reflect relative wealth, wellbeing and poverty should be tabulated and compared, for the entire country, including served and unserved areas. This data is needed for the ICT sector review, as it joins socio-economic data with ICT data; both are needed in order to develop a universal access and service (UAS) programme and identify the potential role and impact communications may have on development.

Socio-economic data review

The result of gathering this data is a basic desk-based comparative study that tabulates the socio-economic and infrastructural wellbeing or poverty of a country. Ideally, to get the clearest picture of the country's UAS status, the study should be broken down into lower administrative levels, e.g., province-by-province, district-by-district, etc. Typically, the following socio-economic data are collected and compiled:

- Population size, density and distribution;
- Number of towns, villages etc., classified by size;
- Income levels and distribution;
- Nature of economic activities and major sources of income;
- Health & health infrastructure statistics and indicators;
- Education infrastructure statistics (e.g., number of schools, primary and secondary, tertiary institutions such as universities and colleges etc.) and education levels and enrolment;
- Composite Human Development Index (HDI); an index combining normalized measures of life expectancy, literacy, education, and GDP per capita for countries worldwide;
- Commercial indicators (e.g., number of bank branches, businesses, etc.);
- Local governments and administrative offices, other institutions, NGOs, etc.;
- Major construction or development activities and programmes in a province or district;
- Basic infrastructure such as power, transportation (e.g., paved roads, etc.), and postal services;
- Terrain (e.g., rugged mountains, hills, savannah, crop lowlands, etc.); and
- Socio-cultural distinctions that may have relevance (e.g., ethnicity, religion, language, minority groups, presence of indigenous people, nomads, etc.).

In addition to the government's official statistics office, sometimes various ministries (agriculture, local government or rural development, planning, transport, health and education) have useful additional resources and a good understanding of the specific needs of regions and certain population groups. Also, banks that have a national-wide presence, as well as farmers associations, NGOs, development agencies and micro-finance institutions can contribute valuable information. A benefit of this level of research is that it will help the UAS programme identify and connect with other development initiatives.

Once data is collected, its comparative analysis provides an understanding and description of the country's geographic zones, regions,

administrative departments, municipal units and other population centres. The output can provide both descriptive material and tabular comparative analyses that can be used to classify the country's regions for total market capacity (potential revenue), level of development, as well as identify the existence of social and physical infrastructures that create demand for communications services in unserved areas.

ICT data Review

After analysing the socio-economic data, it is necessary to review the existing communications infrastructure throughout the entire country. As discussed previously, understanding the country's communication infrastructure will:

- Identify which services and applications the infrastructure can support;
- Identify the infrastructure gap
- Identify the next steps for achieving universal access and service (UAS);
- Identify feasible upgrades and alternatives, as well as any potential for leveraging existing technology for new types of services.

The ICT sector review also necessitates a thorough review of current policy and regulatory frameworks – including issues such as tariff policy, spectrum allocation, licensing and liberalization, among many others (see also [Chapter 2](#) on regulatory reform and UAS). In addition, developing a clear view of the policy changes likely to be implemented in the short-to-medium term is essential because these changes will determine what infrastructure development and service provisions will be available in the near future, and these, in turn, could be leveraged for Universal Access (UA) and rural ICT projects.

A helpful tool for the ICT sector review is to interview various industry players. This may be outsourced to an independent expert entity or accomplished through a qualitative questionnaire. In addition to obtaining detailed information on the existing and planned infrastructure from each operator, questions as to any planned policy initiatives, market development and regulatory constraints may be included. The interview or survey process ideally includes the main telecommunications and Internet infrastructure and service providers, a few of the smaller players, and if possible, potential new entrants and alternative service providers (e.g., railway, power companies). If they exist, public phone operator companies and others related to telecentres or Internet cafes could also be interviewed.

This process provides a good understanding of the existing context, demand, constraints and opportunities within the telecommunications/ICT sector in terms of reaching the country's unserved communities and achieving UAS for both telephony and the Internet.

These interviews, crucial to identifying the current status of UAS, will ascertain which areas will be served commercially and which will require intervention. The topics to be discussed with the relevant communications operators and service providers include the following:

- Network related topics:
 - Network statistics, current coverage, points of presence (POPs), bandwidth capacities;
 - Cost structure, both capex and opex;
 - Network expansion and investment plans;
 - Technologies used and future trends/ preferences;
- Financial topics:
 - Revenues (average and marginal) for various services;
 - Expectations for financial returns;
- Market and subscriber issues:
 - Levels/range of services, numbers and types of customers for each service type, etc.;
 - Marketing and distribution;
 - Tariff strategies and prices;
- Public access:
 - Experience with deployment of phone or Internet public access facilities;
 - Current numbers, types and deployment of public ICT access facilities;
- UAS issues:
 - Experience with reach into rural areas and underserved communities;
 - Approaches of the operators and ISPs towards reaching low income people and communities; and
 - Strategic ideas for UAS, etc.

The operators and service providers should be asked whether they are planning to serve the unserved areas and population groups in the near future and which areas or target groups will require government intervention. These discussions may be held in private due to the confidential nature of expansion plans.

It is also very helpful to include non-ICT players that have either a commercial interest in rural areas (e.g., agricultural suppliers) or in socio-economic development, such as donor and development agencies, and NGOs.

Results of the overall ICT sector analysis should be summarized in a report and presented to the telecommunications industry and other relevant stakeholders for validation and refinement. Such presentations also provide opportunities for identifying areas of uncertainty so that further informational needs can be identified and later integrated into the demand study design.

6.1.2 Per capita and household expenditure on communications

Universal access and service (UAS) programme developers can build up a desk-based demand model for unserved areas based on data collected during the ICT sector review which may be refined later through a field demand study. The model uses national data on communication expenditure and projects it to unserved areas. It starts out with the country's total telecommunications revenue divided by its GDP, resulting in the percentage telecom expenditure of GDP. This can be refined with additional data where available, as follows:

- Percentage of GDP accounting for household income (typically 60-70 percent of total GDP);
- Typical rural or low-income compared to average income;
- Regional variation of income;
- Percentage of telecom revenue from business users (to be subtracted from the total telecom revenue for a closer approximation of household expenditure);
- Data on telecom expenditure by households; and
- Household number and size.

By having data on population or household and income in various identified unserved areas, the total revenue generating potential of each unserved area can be calculated on an annual basis, as follows:

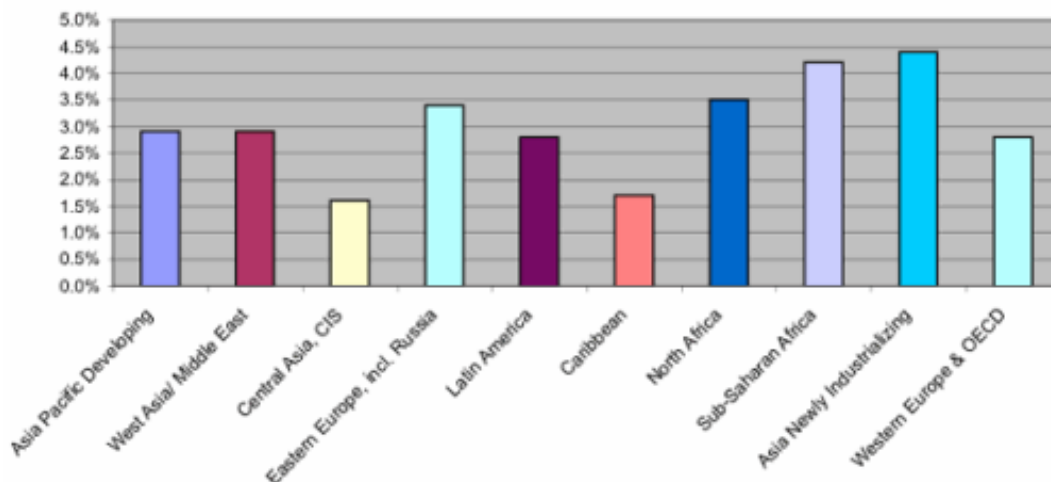
(per capita income) x (population) x (the telecom expenditure percentage)

or

(per household income) x (no. of households) x (the telecom expenditure percentage)

In most countries, the demand for telephone service has been identified at somewhere between 2-5 per cent of a country's GDP, using ITU's indicator of telecommunications revenue as percentage of GDP, as can be seen in the Figure below.

Figure: Total telecom revenues as % of GDP – 2007



Source: ITU-infoDev ICT Regulation Toolkit – UAS Module based on ITU World Telecommunication/ICT Indicators.

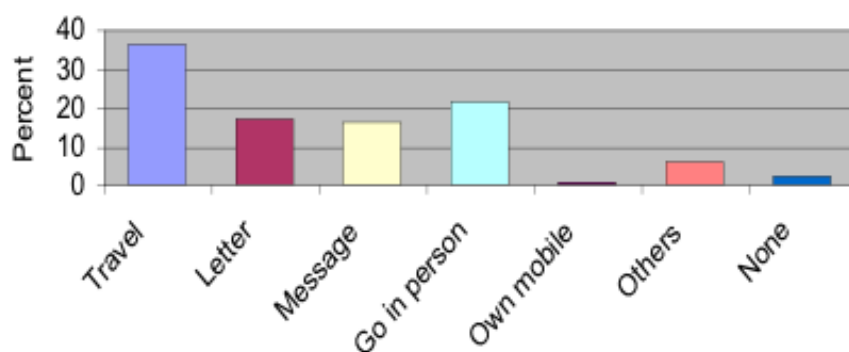
A recent review of several telecoms demand studies in developing countries found a high variability in spending levels per household, as well as significant rise globally of the percentage in household income spent on communications [\[1\]](#).

Field surveys of rural areas in Africa have indicated household expenditure levels of more than 5 per cent in some countries. This makes sense, considering that rural incomes are often lower than average income, thus the expenditure is a higher percentage of the income and also, living in rural and remote parts of the country, the opportunity costs of travelling to communicate are much higher. This makes the argument for communications services all the more attractive. In a large demand study commissioned in 2005, by the Nigerian Communications Commission (NCC), respondents stated they spent on average USD 20.7 per month on the mobile phone (fixed phones are almost nonexistent outside the main cities), which is 7 per cent of monthly household income. In the developed world, phone cost expenditure is typically less than 2% of Gross National Income (GNI) per head, due to a combination of low telephone costs and higher incomes.

People want and need to communicate and are prepared to pay for it no matter what their economic status is. The benefits they receive from communications expenditures are now well known as they relate to routine family, business and emergency matters, and to time and expense savings (the opportunity cost) of alternative means of communications, such as the necessity to travel.

In NCC's demand study, over one third of respondents (36 per cent) indicated that they travel to another town to make a telephone call (as shown in the Figure below). 21 per cent of the respondents actually travel to meet in person because they have no access to a phone. A third of respondents send a letter or use a messenger (or a combination of both – i.e., write a letter and then have a messenger deliver it) to communicate. Approximately 8 per cent do none of the above or selected "Other" (methods of communication) in the survey. Less than 1 per cent of respondents stated that they have their own mobile phones and travel to the nearest coverage area.

Figure: Alternative means of communication due to lack of phone.



Source: NCC Demand study 2005

On average, respondents stated they spend one hour and 40 minutes travelling to make a phone call and return home. The average total cost of return travel to make a phone call is USD 2.84. This is based on over 5,000 interviews in all six regions of Nigeria, and a sample that included urban, semi-urban and rural areas (but excluding major cities).

END NOTES

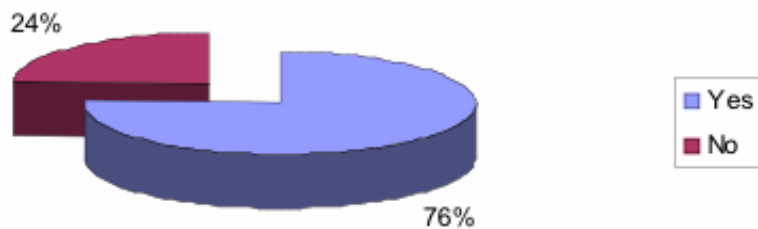
1. See "Telecoms demand: measures for improving affordability in developing countries – A toolkit for action – Main report", Claire Milne, January 2006, chapter 2 on assessing and measuring affordability

6.1.3 Incoming call revenue

When considering the demand and revenue potential of unserved or underserved areas and communities, it is important to include the demand for incoming calls, a significant source of revenue. Adding revenues stemming from calls flowing into rural areas from urban (and international) destinations to revenues from basic service connections and outgoing calls, the total potential revenue from unserved areas and communities could be double what potential users themselves are willing and able to spend.

The following illustrates the results of a rural demand study undertaken in 2005 for Mozambique's Ministry of Transport and Communications. The study of 226 rural households without telephone access in three different districts in the province of Zambezia, revealed that 19 per cent of the respondents stated that they have close family members living abroad, often in Malawi or South Africa. The Figure on the right shows that 24 per cent of respondents stated that they have close family members living in Maputo or another major city outside of Zambezia. These findings predict (incoming) international and national long-distance traffic that might be generated by providing services to those rural areas.

Figure: Family members in Maputo or other major city outside the province

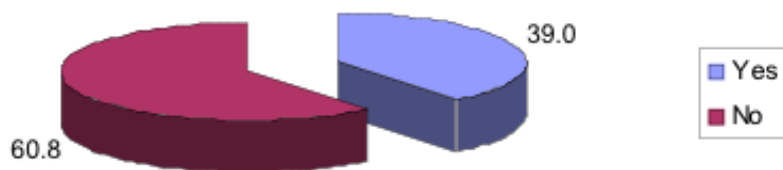


Source: Mozambique Demand study 2005

Further, the study revealed that 92 per cent of respondents would receive incoming calls if their village had phone service. On average, the respondents would expect to receive three incoming calls per week. When asked how many calls they would make on a public phone per week themselves if phones were installed in their village, respondents stated they would make on average four calls.

Similarly, in the 2005 study commissioned by the Nigerian Communication Commission (NCC), 39 per cent of respondents stated that they have family members living abroad, as shown in the Figure on the left. This incoming call market (into rural areas) can generate revenues for carriers either in the form of termination charges or urban customer revenue. In many countries, urban callers tend to be more affluent and can afford more calls and lengthier calls to rural relatives and friends.

Figure: Family members living abroad – in %



Source: NCC Demand study 2005

In Latin America, data from Chile demonstrate that rural telecommunications operators earned more than 60 percent of their revenues from incoming call terminating charges. It is remarkable that rural pay phones in Chile report this significant number of incoming calls because typically, stand-alone pay phones are not set-up to receive incoming calls as easily as a phone shop that has an operator in attendance [1]. For pay phones to be effective for incoming calls, they need someone living close to the payphone who is willing to receive incoming calls and relay messages to the called party, or who is willing to set up appointments between the caller and called party.

Another example of significant revenue potential made from incoming calls, is Bangladesh's Grameen's Village Phone programme, discussed in detail in [Section 3.3.1](#). This well-documented case illustrates how telephone service can be extended to low-income, rural populations. The average usage of the village phones amounts to about 1600 minutes per month, out of which approximately 1000 minutes are from incoming calls [2].

In conclusion, when estimating demand, incoming call revenue needs to be included, either through data gained from a demand study or reasonable assumptions based on data from comparable markets.

END NOTES

1. Björn Wellenius, *Closing the Gap in Access to Rural Communications – Chile 1995-2002*, World Bank Discussion Paper No. 430, February 2002. Pg. 12
2. Grameen website (<http://www.grameen-info.org/grameen/qtelecom/index.html>)

6.1.4 Demand for Internet services

In developing countries that include access to the Internet as part of their universal access and service (UAS) policy, the target is typically not individual household access but public access to the Internet. Thus, this public usage through Internet cafés and telecentres needs to

be forecasted, as well as some private demand for Internet services. This section discusses methods of forecasting Internet demand.

An estimate of the total revenue potential should be made, including both public demand at telecentres and private demand of households, businesses and institutions. The estimate should include private demand in order to assess the feasibility and viability of extending Internet infrastructure and service to a targeted area. Further, demand can be broken down into the various Internet related services (from e-mail via browsing to Internet telephony, e-commerce or e-government services) as well as several pricing models (time-based, data-throughput-based, flat-rate and bundled pricing).

Demand obviously has two dimensions – those who want to use Internet services, and those who can afford to use it, e.g., many youths want Internet access but often can't afford it. Assessing potential demand for Internet in unserved areas starts with interviewing the existing national ISPs and cyber cafés, and collecting other key data on topics such as the following:

- Internet subscriber penetration (business/ household);
- Internet user penetration;
- Socio-demographics of Internet users;
- Computer penetration (if possible, disaggregated by urban and rural, and business and household);
- Number of businesses and institutions (per region, administrative units);
- Typical Average Revenue Per User (ARPU) per standard or low-end user;
- Typical ARPU of business users;
- Typical ARPU of specific institutions (e.g., NGOs, local government offices, schools, health centres, etc.);
- Typical respective data speeds to different types of users; and
- Data on cybercafé number, usage, revenue, and services that are most in demand.

The above data provide an understanding of how much demand there is for the Internet in rural and underserved areas and should be used to develop a demand model. However, the model may have to use certain assumptions, which need to be conservative and are likely to vary from country to country. Some illustrative and hypothetical assumptions that might be made from the data are:

- If Internet user penetration is 20 percent (nation-wide), then a plausible assumption could be that demand in unserved areas comes initially from 10 per cent of the population;
- If the national average for telecom users is USD 10 per month on communications, then an assumption might be made that users in unserved areas might spend USD 5 per month; and
- If 30 per cent of nation-wide businesses have computers, a starting assumption might be that 15 per cent of businesses in unserved areas have computers;

These assumptions can be tested by the field demand study where actual and potential users are interviewed. By preceding the demand study with a sector review, the field demand study will then focus on indicators that are actually required to model demand and assess feasibility for the UAS programme. This will support the development of an effective UA programme.

The demand study makes it possible to develop an estimate of the number of short-to-medium term potential Internet users on a district-by-district basis, and a resulting estimate of potential revenues and subsidies for the provision of an ISP wireless access system. In many developing countries, the degree of confidence will be less than for telephony as data in this emerging Internet market is more transitory and less reliable.

Businesses and institutions as vanguard users of Internet

In most developing countries, local government agencies, social infrastructure and health institutions, schools, NGOs and businesses provide most of the demand for Internet services. They can be considered intermediaries: while the vast majority of these institutions are located in district centres and/or other small towns, the benefits of their access to the Internet can spread to villages. Many of their clients are villagers who may also visit their offices frequently. There is also a growing public demand for the Internet via cybercafés.

Overall, the potential user community and demand for Internet services has to be identified in a more consultative fashion than that for telephony. In most developing countries it is less advanced than in the developed world and that has more varied uses and applications than telephony. Estimating Internet demand often involves more than the simple identification of the number of business or administrative units. It includes consideration of how to catalyse partnerships between development, administrative and private agencies to create sustainable and scalable ICT demand.

6.1.5 Field demand studies

A demand study carried out in the field (often interviewing rural end-users) is important in the development of a universal access and service (UAS) programme for the following reasons:

- While modelling using desk-based data research and industry interviews is important, there can be data gaps that need to be filled by

a field demand study;

- Key assumptions of a model can be validated or refined through a field demand study – the demand study is the bottom-up approach interviewing end-users, which complements the modelling top-down approach;
- A demand study increases the credibility of the UAS programme with industry and other stakeholders as it represents a thorough investigation and not a theoretical modelling approach; and
- Elements of a potential UAS programme can readily be tested, such as the following questions:
 - What are suitable service levels and required service elements?
 - What are the best public access models in the country's context?

A side benefit of field demand studies is that it can educate potential future users about ICT services and their applications and benefits.

Field demand studies range from sample or pilot field studies to full-scale representative baseline demand studies. These have several levels of depth and accuracy. Demand studies can provide information on the following:

- Needs for communication of various kinds;
- Private demand, affordability and willingness of users to pay for telephone, Internet and other ICT services;
- The numbers, location preferences and mode of public access points;
- Technology and service preferences (e.g., mobile versus fixed, required Internet speeds, broadband needs); and
- Knowledge and demand for different value added and non-voice ICT services.

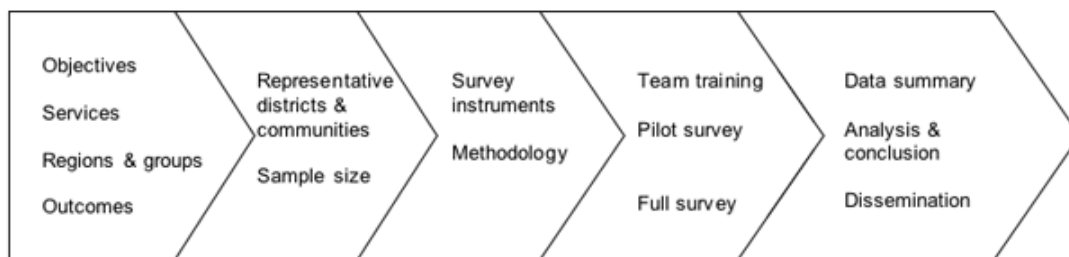
Deciding on the scope of a field study

Various factors – e.g., size of country, expected scale of UAS programme and whether or not a pilot project is planned – will influence the required scope of the demand study. The scope of the field study will also depend upon what data is already available and how reliable the data is. Demand studies require money and time and thus determining the right size of the demand study is important. Key questions to be asked in determining the scope and size of a field study are the following:

- Is there the political will or the need to include certain regions or populations? E.g., some countries have strong regional or ethnic differences that require field studies to be more inclusive than others;
- How reliable is the existing available data? E.g., if there is good quality data and research on household income, population and ICT usage then the field study can be smaller and focus more on specific UAS issues;
- What assumptions industry and policymakers make about the demand for and importance of UAS? E.g., in some countries there might still be a prevailing perception that communications is not as important as other development initiatives. Access to the telephone or the Internet may be considered a luxury in unserved areas where fundamental needs such as food, water and roads are not served. In those cases, a wider demand study can be an educational tool and provide credibility that will assist in changing perspectives among stakeholders;
- How comfortable are (industry) stakeholders with certain demand model assumptions? E.g., if there is more uncertainty about demand indicators and assumptions, then a field demand study is required to solidify the model; and
- Is a pilot project planned? E.g., a pilot project can provide hard data on demand, affordability, revenues and sustainability. If a pilot is planned, the demand study may focus mainly on the planned region or area of the pilot.

Elements and process [1]

A field demand study can be designed either for telephony or non-voice ICT, or both. Usually, a demand expert designs the survey with the assistance and active collaboration of a local research institution (e.g., university social research department or institute) or a market-research company. The following diagram shows the various steps of a field study, which ideally, is based on a prior desk study.



Source: A rural ICT toolkit for Africa, Andrew Dymond, Sonja Oestmann, infoDev 2003 (updated)

For an overview of a demand study design, see the *Practice Note A demand study in rural areas in Mozambique*.

Step 1: Study objectives

Study objectives articulate the purpose of the study, outline the services to be investigated, determine the region(s) in which the demand study is to be conducted and identify which target groups are to be interviewed.

A UAS demand study that focuses on telecommunications and Internet services in areas that currently don't have services has the following objectives:

- Identify and assess the potential demand for both voice and Internet services;
- Determine user ability to pay for communications services, including priority customers such as business and institutions;
- Explore needs and preferences of users regarding private and business service, public phones, public access for the Internet, value-added services (VAS) and required Internet speeds; and
- Explore and validate appropriate UAS targets for desired service levels. This could include travel to public phones, numbers and type of public phones and public access for the Internet.

Step 2: Selection of representative districts and communities

If representative provinces, districts and communities are carefully selected for the study, then a smaller sample may be used. Although statistically representative field studies may be desirable, they are expensive and time consuming, and in most cases their level of accuracy may not be required for the purposes of a UAS programme design.

Based on an earlier desk study, the following criteria and questions should guide the selection of a representative sample from which results can be extrapolated nationally:

- Does the sample cover all typical or key regions and districts?
- Does the sample cover gender and age groups representation?
- Does the sample cover typical sizes of villages or towns?
- Does the sample cover both areas with telephone and ICT services and areas without?
- Does the sample cover various economic situations (e.g., poor to more affluent areas)? and
- Does the sample cover different population densities and terrain (e.g., remote and sparsely populated, more densely populated, mountainous or plains, etc.)?

Step 3: Survey instruments and questionnaires

There are several general considerations to take into account when developing questionnaires. These are as follows:

- The length of the interview – respondents can become impatient or bored if the questionnaire is too long resulting in poor quality of responses. If possible, limit questionnaires to 30 minutes;
- Self-administered versus interviewer-administered questionnaires – the latter is the preferred approach in underserved areas, which are often rural and where literacy might be an issue. Interviewer-administered questionnaires allow more control, consistency (as questions can be explained in case of misunderstandings) and higher completion rates;
- Open and closed questions – this depends on the objective of the study; open-ended questions require a more complex analysis and classification process, and should be used sparingly. On the other hand, closed questions are prone to confirm preconceived expectations. Multiple choice questions are an effective compromise between open and closed questions and ideally are tested or developed through initial pilot surveys with focus groups and with more open-ended questions.

Typical UAS demand survey instruments include questionnaires for private, business, community leaders and informants, and might have separate surveys for telephony and Internet. A rapid community assessment checklist, in which the researchers are requested to record a set of community data for each locality targeted, is also useful to aid later analysis of survey results.

The methodology and survey instruments of a field study could include a mix of the following:

- Focus group discussions. Depending on the objective, several open interviews can be conducted for purposes of generating a discussion around some of the key hypotheses of the survey and the planned UAS policy or programme. Focus groups can be used to develop the questionnaire design and to tailor multiple-choice questions. Special attention should be paid to variations in the socio-economic characteristics of participants and actual access and utilization of telecommunications and Internet services. Examples of topics to discuss might include:
 - The location of public telephones and/or telecentres;
 - The distance people are willing to travel;
 - The main use of the phone and/or the Internet; and
 - The amount they would be willing to spend.
- Key informants. A few key informants, (ideally in each district surveyed) selected on the basis of their overall knowledge of the area and use of ICT in the community, could be interviewed. Key informants can provide considerable qualitative information about the area, economy, local village life, etc. They can include district administration officials; representatives of health centres, schools, community leaders, business people, phone operators, NGOs, head of farmer associations, local bank branches, etc.;
- Household & small business survey. At the heart of the field demand study is a stratified random sample of a significant number of households and small businesses in each community. An interviewer-administered questionnaire with both closed and open-ended questions is typically used to solicit responses from male or female heads of households; and

- Rapid community assessment. This assessment profiles the community being surveyed and details the number and type of key administrative and social or public infrastructure institutions, businesses, households, market(s), and other key social collection points, transportation facilities, etc. that generate demand or locations for public access.

Control groups

A further distinction is required between existing users in areas where people have access to telecommunications or the Internet, and potential users where there is no access. Demand studies typically need to include at least one control group from areas that have access to the telephone or other ICT services. By doing this, the study can measure the actual existing demand, usage and willingness to pay.

Overview of key elements of various questionnaires

The questionnaire typically covers, as a minimum, the following areas:

Key information on village	• Other infrastructure (how connected or how remote is village?) • Business structure (retail, agriculture trade, animals, markets, etc) • Dominant economic activity
	• Main agricultural crops • Existing institutions in villages (schools, doctor, etc.) • Average household income
Demographics of respondent	• Age • Family situation • Occupation • Education • Language • Income
Demand Topics	• Current phone availability • Phone usage (frequency, purpose, duration, spending, etc.) • Satisfaction and quality of existent services • Services desired (incl. interest in voice-mail boxes) • Price perceptions, affordability and willingness to pay • Possibility of incoming calls • Costs incurred through having no access to telephone (e.g., travel) • Current communications alternatives: postal services, HF radio etc.
Socio-economic impact (if required)	• Current communication patterns • Alternative means of communication in absence of phone or Internet • Cost of the alternative means of communication • Perceived impacts on business and personal affairs • Travel cost savings from use of phone or information services • Other savings or benefits and their valuation

Examples of different types of questionnaires used in a rural demand study in Mozambique are provided as Reference documents.

Step 4: Training and pilot survey

The actual training of the research team helps to deepen their understanding of the field survey objectives, and role-playing the interview process among the researchers has been found particularly helpful. An initial pilot survey is recommended to give the survey team a test-run and to refine the methodology and survey instruments before beginning the main research.

Step 5: Analysis of demand study findings

The results of the field demand study will inform and refine the UAS programme design. Demand studies also help to adjust previous estimates of cost, revenue and commercial viability, and the amount of subsidy likely to be required per area or project. Typical results of demand studies indicate the following:

- The current accessibility of telecommunications and ICT networks and services, both in terms of how much they cost and how far end users need to travel in order to use them;
- Potential penetration of private telephony and Internet service (fixed or wireless) amongst businesses, schools, clinics, government offices, households, etc.;
- Which technology is requested (e.g., fixed versus mobile, high-speed up to 256 Kbps or broadband Internet connection);
- Identifying the optimal number of public phones or telecentres per community or neighbourhood, as well as the population size to support each public phone or telecentre, best location, preference for mode of public access facilities (e.g., manned or unmanned, coin pay, card phone, etc.);
- Interest in Internet and potential for public access to telecentre services;

- Private Internet demand;
- Interest in voice messaging, SMS (text), information services, e-mail, fax, etc.;
- Readiness of schools, institutions, and businesses for Internet or participation in ICT programmes; and
- Potential partnerships that could be forged to stimulate sustainable and scalable demand for Internet and ICT services.

Caution about household income data

While field studies are infinitely more valuable than simple desk-based modelling in many regards, there are still some challenges. For example, obtaining data on household income through questionnaires is notoriously difficult, especially in developing countries. The main challenges in determining income are as follows:

- People usually do not like to disclose their income level and may under-report it;
- A larger number of people, especially in rural areas, have incomes that vary from month-to-month. Some may not know, or be able to predict, what their monthly household income actually is (e.g., shopkeepers, self-employed, and especially farmers or labourers whose income is seasonal), and while they may know their seasonal incomes, they may not be able to calculate a monthly average household income;
- People's income is often derived from numerous sources, e.g., their shop, from breeding and selling animals on the side, occasional jobs, etc. Again, in many cases people do not know how their income from various sources averages out over the year, and are not able to state a monthly household income;
- Income sources that are non-cash, contribute to the wealth of households. Examples of this are barter, trade and subsistence farming;
- Several household members may contribute to the household through various activities and employment (e.g., the grandfather tends animals, the father has a shop, the mother does some sewing, and the oldest son works part-time at a garage and might give his parents part of that money);
- In some countries a considerable number of people derive income from the grey or black market [\[2\]](#) which they are hesitant to report.

Demand related to Internet services is in many cases even more challenging to assess as there are numerous Internet applications and services as presented in [Section 6.1.4](#).

Therefore, in general, results from desk or demand studies are still approximations to actual demand, but they are likely to provide the best information that is available.

It is very helpful to disseminate the field demand findings to the sector and other stakeholders and make it available to the public e.g., through publishing it on the regulators web-page. The survey output can specifically be used for the next step of UAS programme development which is the modelling costs, viability and subsidy analysis described in [Section 6.2](#).

END NOTES

1. The following sections are an expanded, adapted and updated version of Chapter 5 in *A rural ICT toolkit for Africa*, Andrew Dymond, Sonja Oestmann, *infoDev* 2003
2. The grey market is the trade of something legal through unofficial, unauthorized, unintended distribution channels. The term black market refers to goods and services that are illegal in themselves and/or distributed through illegal channels.

6.2 Modelling costs, viability and subsidy analysis

Once the ICT sector analysis and assessment of demand are conducted, the costing aspect needs to be addressed in order to develop a universal access and service (UAS) programme:

- How much will the UAS programme cost and how much will individual projects cost;
- What is the commercial viability and sustainability of the UAS programme and projects; and
- What is the estimated financial shortfall between the cost and revenues through the provision of UAS services, and therefore how much subsidy is required to finance UAS.

The following methodology on modelling costs and viability and subsidy analysis is designed to assist UAS programme development in the context of a Universal Access and Service Fund (UASF) using competitive mechanisms to allocate subsidies.

The typical process to competitively allocate UASF subsidies for UAS service projects is as follows:

- Identify how much subsidy an operator or service provider needs in order to construct the stipulated level of infrastructure and to provide UAS service to the target area, population group or project, using current least-cost technology that meets the required quality and level of service; then
- Submit the specified area to be supplied with UAS services to tender and accept the lowest bid commensurate with meeting the

published technical, corporate and operational pre-qualification requirements, provided the required subsidy is less than or equal to the set maximum subsidy.

The methodology for calculating the amounts of subsidy to be offered is designed to achieve, with the subsidy, commercial sector investment and sustainable operations.

The purpose of establishing maximum subsidy levels is to set a realistic ceiling. It is not necessary to establish exact costs and a detailed engineering study by the regulator is not required. An illustration of the methodology used to estimate the maximum subsidy is described in [Section 6.2.1](#) for a public access telephony project and in [Section 6.2.2](#) for a public access Internet project

This methodology is chosen, among other reasons, because the regulator has less information than telecommunications operators and service providers have about the costs of providing UAS services. Operators and service providers also consider their financial and non-financial benefits they may stand to gain from providing UAS. Some of the benefits of being a UAS provider may include:

- Increased brand recognition;
- Good public relations;
- Additional private revenue; and
- More traffic due to increased national network, etc.

With a maximum subsidy amount in place, the competition among operators and service providers ensures that costs are not inflated, and that the operators include their tangible and intangible benefits from being a UAS provider into their considerations for the subsidy request.

6.2.1 Revenue and cost estimation for public access telephony

For every universal access (UA) region or project, the expected communication service revenue and costs to supply the service can be estimated and submitted to a viability test. This viability test will establish if a certain project needs a subsidy in the first place, and if so, will calculate the likely maximum one-time subsidy that an operator or service provider would require to provide service in a commercially sustainable manner.

Revenues

The revenue estimate typically takes the following into consideration:

- Regional/rural population (p);
- Regional/rural per capita income (i), estimated either as:
 - the average of the lower deciles of national income distribution – corresponding to the proportion of the population who are rural (this assumes that the rural population is generally at a lower income level than urban), or
 - an average for the region (e.g. district, provincial) GDP (for example household income from UNDP studies); and
- An expenditure factor (e), which is the percentage of income spent on telecommunications. This can be the national average, or a more conservative regional (e.g., district, provincial) estimate, or findings from demand studies, if available.

Revenues can thus be estimated as follows:

$$R = p \times i \times e$$

(Revenues = Population x rural per capita income x expenditure factor)

Findings from demand studies are helpful to refine the input for (i) – the income of rural people, and (e) – the communications expenditure factor.

While the installed public access phones will not necessarily be able to capture all potential demand, it is likely, if wireless technology is used, that the potential service provider will also be able to capture some private demand, including business and institutions, as well as revenue from urban customers travelling to those rural areas.

Costs

The capital and operating expenditure costs of supplying service can be estimated using the pre-dominant technology (usually wireless) utilised by existing operators and service providers in the market. This assumes that existing operators will be interested in expanding into the unserved areas targeted by the UAS policy. Using the predominant technology will represent the cost ceiling, since more cost-efficient alternative and newer technologies, whether selected by the major operators or new entrants, would generally need to be less expensive to be considered competitive solutions.

Maximum subsidy estimate

The maximum subsidy requirement may be calculated in one of two ways:

1. Construct a 10-year cash flow for each project and area, showing revenue (with an allowance for growth over the cash flow period), capital and operating costs, and calculate the net present value (NPV) using the operator's assumed cost of capital as the discount rate. If the NPV is negative, this amount will represent the maximum subsidy required by the operator to provide service. If the NPV is positive, this indicates that no subsidy may be required, although it will be necessary to investigate alternative revenue and cost assumptions to determine the robustness of the calculation; or
2. Make a basic benchmark calculation that assumes a standard pay-back period of capital cost from revenues of perhaps three years, which is typical for private telecommunications investments. If the projected revenues are greater than 33 per cent of the capital costs (meaning it takes less than three years to achieve pay-back), the project is viable. If they are less than 33 percent of capital cost, the project has negative viability. This will indicate whether, and by how much, the revenues fall short of providing the operator with an acceptable rate of return.

Whatever method is used, both models and their assumptions should be discussed with operators and service providers.

Either of the above methodologies should safely estimate the maximum subsidy required for the following reasons:

- The assumption that public service points will be the prime instrument for securing potential revenue is conservative. In the event an operator is also able to use the same infrastructure to provide private services (e.g., mobile services to individuals that possess a mobile phone), more revenue could be available from some private customers. In this event, the actual revenue would be higher than that calculated by this methodology; and
- The revenues are based only on local (rural) affordability. For example, if revenue from incoming calls is significant, and is also encouraged through a good interconnection arrangement (such as asymmetric interconnection) and revenue share with a village phone operator, it is possible that operators' incomes could improve significantly due to incoming calls from urban areas.

6.2.2 Revenue and cost estimation for public access internet

In many developing countries, there is limited information regarding the cost and demand for semi-urban and rural Internet provision. While field demand studies are very helpful overall and in some countries provide the very first survey-based data from rural areas, they often still yield insufficient solid data on Internet demand in some countries where many people have not used the Internet before. A potential guide for estimating cost and demand is through examining the experience of other universal access and service (UAS) programme designs and tenders. In 2004 in Uganda, district level Internet POPs have been subsidized between USD 10,000 and USD 60,000 and public Internet centres for between USD 15,000 and USD 25,000, however, data evaluating their sustainability are not yet available. Subsidy estimates include the capital, the cost of the digital bandwidth leased from terrestrial service providers, and the initial promotion, marketing and basic training.

For estimates of potential subsidy requirements for an Internet programme, it is usually recommended to offer a value equal to almost the entire capital costs of a district centre POP and a public access centre. The reason for this is that demand for Internet is typically less immediate and takes more time to build up, and operating, maintenance and staff costs in districts are considerably higher than in cities.

Offering the entire capital costs as the maximum subsidy, and then letting the market determine the real subsidy through competitive bidding, ensures that it will not be under-estimated. As an example, capital costs for the Internet component of a pilot in Mozambique are estimated at USD 75,000. This included VSAT backhaul as the worst-case scenario. Details of the cost components are shown in the Table below:

Table: Once-only costs of one rural Internet POP and public Internet access point offered as maximum subsidy in competitive bidding process

	Capital (USD)
Network infrastructure & services	
VSAT terminal including all electronics hardware, power & support	8,000
Wi-max type broadband base station electronics	6,000
IP server computer & Interface	5,000
Tower / support structure (expected to be building roof mounted)	3,000
Ancillary equipment (e.g. standby power)	4,000
First year leased bandwidth (0.25 E1)	12,000
Miscellaneous	5,000
Network Subtotal	43,000
Internet public access / ICT systems	
Average 6 computers for Public Access Centre @ US\$1,000	6,000
Printer/scanner & other accessory equipment	1,000
LAN & power supply equipment	2,000
Internet user terminals for first year	5,000
User Subtotal	14,000
ICT 'Soft costs' and operating budget support	
Initial recruitment, HR development and training	5,000
Customer awareness, training and support	6,000
Extra maintenance & operational support (\$100 for 24 months)	2,400
Marketing and incentives to secure customers	3,000
Soft cost Subtotal	16,400
Total capex invested (incl. capitalization of soft costs)	73,400

Source: Mozambique Universal Access Internet pilot programme 2007

6.3 Economic impact of UAS projects

As discussed in [Chapter 1](#) of this module, countries develop universal access and service (UAS) policies based on the premise that providing access to basic and advanced telecommunications and ICT services have a wide-ranging socio-economic rationale.

There are general studies and analyses, sometimes conducted by academics, that address broader questions of economic impact of communications, ICT and broadband Internet. Their understanding and latest knowledge is an important background for UAS policymakers and UAS program planners, as these studies provide the general rationale and justification.

[Section 6.3.1](#) outlines the impacts of communications and [Section 6.3.2](#) discusses the status of research for broadband Internet and ICT.

In the case of telecommunications projects, it can often be demonstrated that there is significant benefit in the form of 'consumer surpluses', over and above the price paid for the service. These include items such as the following:

- Businesses (small or large) often report that the money they save due to greater efficiency and saved personal travel time related to stock control, delivery co-ordination, following up sales opportunities, maintenance calls, etc. amount to several times the cost of the telephone rental and calls they make.
- Farmers and micro-business proprietors often report that the phone enables them to gain timely and geographically-specific information on urban market prices that increase their bargaining power with 'middlemen' and enable them to earn more for their product or secure a better price for their inputs.
- A third of personal calls typically represent personal or family emergencies that would again require travel or other costs if the call was not made. Sometimes people report their benefit in terms of lower health risk, a life saved, better family relationships, more opportunities.
- Institutions and government agencies – schools, clinics, local administrations, NGOs and other development agencies - similarly report increased efficiencies and the ability to deliver services in a more timely, effective and less wasteful manner through use of the telephone.

The benefits of broadband Internet and ICT are less direct and more difficult to quantify, though, there is general consensus that critical macro-economic value is gained from the provision of broadband access to ICT services. Research and analysis on measuring broadband impact are only beginning.

What is clear is that the impact of broadband is highly dependent on framework conditions within the country and also within the sector which is to benefit from broadband access. An example to illustrate this is the following: a health project plans broadband connections to be provided to rural district hospitals to facilitate remote diagnosis, consultation, transmission of imagery and data, and video-conferencing between the rural hospital staff and specialist doctors in the urban hospitals. In order for the health sector to reap the benefits, certain conditions need to be in place, such as:

- Trained staff at rural hospital to operate and maintain necessary ICT facilities and equipment;
- Increased staff at the urban consultation hospitals to be able to accommodate increased demands through rural hospitals;
- Privacy regulation on patients records which are electronically submitted; and
- Cost accounting and financial incentives for urban hospitals to provide remote consultation to rural hospitals.

Successful case examples of how broadband and ICT is addressing crucial development issues need to be studied in terms of there required pre-conditions to be transferable to other countries. Another important aspect is their sustainability. Piloting broadband networks and ICT projects maybe a helpful tool to adapt and refine the models to be used for a particular country and assess the required inputs, outputs, outcomes and project efficiencies.

While the economic impact provides the broad rationale for UAS programmes and projects, nowadays UAS programme development typically requires less extensive detailed economic analysis, as it is more widely accepted that ICT are crucial for socio-economic development. In UAS programme development it is about making choices and decisions on how to prioritize UAS projects among available options. Section 6.4 presents practical approaches, considerations and methods that are used to help to prioritize UAS projects, some based on financial analysis and others considering benefits.

6.3.1 Economic impacts of communications

Since development planners first recognized the immense socio-economic impact of communications, general hypotheses about impacts with regard to rural communications systems have evolved, and have been demonstrated to various degrees, in a wide range of studies since the early 1980's.

In 2005, the study *The Impact of Telecoms on Economic Growth in Developing Countries*, has added to this long history of previous research, conducted over many years, to demonstrate that telecommunications has a significant impact on economic growth. This research has highlighted the particular impact of mobile communications penetration on economic growth.

The socio-economic impact of communications can be summarized as follows:

- General regional integration:
 - Areas with communications are less isolated economically and socially, are better able to enter the market system, and will experience improved political administration and social services;
 - The benefits can be described as macro-economic and structural, e.g., development of market system, and the enablement of the services and information sectors; and
 - The level of impact is increasing and becoming more widespread the more mobile the communications medium is becoming [\[1\]](#).
- Market & social infrastructure:
 - Typically 25-40 per cent of calls made from rural public phones or payphones in developing countries can usually be classed as related to administration, business or financial matters [\[2\]](#);

- Related to commercial markets, better communications provide both the means and sources of information regarding the price of rural products, typically yielding fairer market relations and more efficient operation of the market system;
- Improved organizational management is possible – most organizations (e.g., government, health, education and transportation) and businesses run more efficiently as communications services improve, resulting in better coordination, stock ordering & replenishment, more timeliness, and quicker response to operational and maintenance needs; and
- New market and employment opportunities – businesses can organize better outreach, market access and market expansion.
- Personal urgent need to communicate:
 - Typically 10-15 per cent of calls made from rural public phones or payphones can usually be classed as 'personal urgent'. These typically relate to health, family emergencies or other matters considered urgent enough that some other form of communication – often personal travel to deliver a message – would have been necessary; and
 - Urgent matters often include notification of family or social events, coordination of travel arrangements, or such matters as school exam results, deadline related matters (e.g., financial enquiries, school entry applications), etc.;
- Personal non-urgent communication:
 - Up to 50 per cent of all calls are typically classed as personal and non-urgent, but nonetheless important enough that people are willing to spend 3-5 per cent of personal incomes on them; and
 - The benefit enjoyed is the reduction of isolation for family members living elsewhere, especially with younger generation members studying or working in the capital city.

A compendium of cost-benefit results illustrating many of the above benefits are documented and discussed in the reference document *Methodology for Economic Analysis of Telecommunications Projects*.

The expected economic impacts and targets of a universal access and service (UAS) programme should be stated as specifically as possible, in order to assist with final selection or prioritization of projects. The Practice Note *Specific regional and poverty reduction impacts in Mongolia* provides an example for this.

END NOTES

1. The Impact of Telecoms on Economic Growth in Developing Countries, Leonard Waverman, Meloria Meschi, Melvyn Fussi, March 2005.
2. For example, evidence of this has been recorded in World Bank sponsored studies undertaken by Intelcon in Nigeria (2005), Burkina Faso (2004) and Mozambique (2005).

6.3.2 Economic impacts of broadband Internet & ICT service deployment

With the proliferation of broadband connections worldwide, the Internet is increasingly described as being always on and with a minimum speed of 256 kbps. This broadband Internet moves well beyond traditional dial-up and mid-speed Internet (e.g., less than 256 kbps) in terms of the applications it supports and the value it offers. While dial-up Internet offers some additional value over telephone communication, in terms of basic Internet browsing, e-mail, and simple document transmission, most agree that the Internet's full capacity is only realized through broadband Internet that allows the use of multiple ICT applications and services.

Assessing the economic benefits and impact of broadband Internet is fundamentally different to assessing the impact of telephone communications, for the following two reasons:

1. A broadband Internet connection does not in itself provide any value or service, thus contrasting with a traditional telephone connection that provides an instant use and benefit through immediate and direct verbal communication (saving travel costs and time of alternative means to communicate). Only the use of Internet services and applications made possible through a broadband connection create benefits for the user, such as remote network access, VoIP services, video-conferencing, online-banking etc.; and
2. The realization of benefits from broadband for a country is strongly dependent on overall conditions such as the: regulatory framework (e.g., security for e-commerce transactions, laws for on-line banking, etc.); business environment (e.g., computer penetration, ability to develop skills, capacity for organizational change); supporting infrastructure (e.g., reliable electricity); and ICT literacy among the population, among others.

Like electricity, ICT may be considered a general purpose technology, which is characterized through its pervasiveness throughout the economy and society, its constant evolution and improvement, and its capacity to spawn new innovations.

Measuring economic benefits of broadband

Due to broadband Internet's multitude of applications and its recent national spread in certain markets only (in many developing countries it is limited to the main urban areas only), it is more challenging to measure its economic impact than traditional telephony. As a consequence, the situation for measuring the impact of broadband can be summarized as follows:

- It is still in a nascent stage – the first attempts at gathering empirical evidence were made in 2003 in Ontario, Canada (see box below), and in 2005 with national scale data from the United States [\[1\]](#);

- It is often restricted to the developed and most advanced nations; and
- There is little quantifiable proof and no internationally comparable data of value [2].

Also, in developed countries the impact of broadband is measured at the individual subscriber level, while most developing countries are aiming at providing broadband at a community level.

A method to measure the benefits from services used via a broadband connection in the developed world is to make the simple assumption that the direct benefit must be higher than the cost of the broadband connection to the subscriber, otherwise they would not subscribe. The assumption is that the subscriber has conducted a personal (or household) cost/benefit analysis and has determined that the net benefit outweighs the cost. This is a reasonable assumption since the market is the final arbiter of value, and demand is the indicator of benefit.

In general, a useful approach to assessing the impacts of ICT is as a system that looks at inputs, outputs, outcomes and efficiencies, as follows:

- The inputs are mainly the costs of providing broadband to a market including any required complementary investments;
- The outputs are direct results of the inputs, e.g., a certain number of broadband connections within that market, number of schools or hospitals connected, number of ICT services used, number of on-line training courses provided, etc.;
- The outcomes are measured through the impacts of the outputs such as: number of school-children now ICT literate, number of hospital staff trained via on-line courses etc.; and
- The efficiencies of the investment which concerns the cost to produce each unit of output, e.g., USD 5,000 per school to provide broadband connection, USD 500 per on-line course per person, etc.

Example: ChileCompra – levelling the playing field

ChileCompra, the Chilean government's online procurement system launched in 2000, has saved over USD 70 million in 3 years over the placement of notices in publications, and by increasing efficiency. ChileCompra has increased transparency by giving open access to details of all contracts for good and services procured by the public sector. The system also has a distinct advantage for the private sector since it provides an equal opportunity to all companies to obtain contracts and has helped to balance the distribution of these contracts. While in the overall Chilean economy 80 percent of all business sales are generated by large companies (and only three percent by micro companies and 17 percent by small and medium enterprises), 53 percent of sales through ChileCompra went to large companies and 35 percent went to small and medium enterprises. Twelve percent of contracts were signed by micro enterprises.

Source: ITU adapted from EU and ChileCompra

Findings of studies so far

There are studies that have attempted to analyze and measure the economic impacts and benefits of broadband Internet. In general, these studies found evidence supporting the following impacts:

- ICT sector growth;
- Productivity gains;
- Transformation of how individuals, business, government and other parts of the society work, communicate and interact – transforming economic relationships and processes in the private and public sector; and
- Reduction in pollution (due to reduced travel).

In particular, a study in 2004 [3] analyzed direct benefits to subscribers, the benefits to providers of services, and indirect benefits arising to others as a result of broadband across Europe, and concluded that the potential economic impact of broadband is very significant but that it varies between countries. The variation is mainly dependent on three factors – the size of country (the greater the number of subscribers, the greater the benefit), the cost of transportation (the higher the cost of transportation, the higher the benefits of reducing travel through ICT) and the value of time (the more time is valued, the higher the benefits as ICT saves time).

Another study from 2006 [4], analysing data from the United States on the effect of broadband on several economic indicators, stated that the analysis supports the conclusion that broadband positively affects economic activity, and in particular more rapid growth in employment, the overall number of businesses, and business in IT-intensive sectors.

An illustrative example of benefits of broadband in Canada can be found in the Practice Note South Dundas Township and their broadband experience.

Implications for developing countries

While specific academic detail and quantifiable data on the impact of broadband Internet is still being gathered, it is nevertheless evident that broadband development does have significant macro-economic impact.

However, “it is not clear to what extent ICTs have helped to directly reduce major development concerns and particular those of the Millennium Development Goals (MDG), such as poverty, hunger or sickness.”[5] The existing studies have shown that the economic impacts

and benefits are variable between countries and dependent on framework conditions. Therefore experiences and models, especially from the most advanced world, are unlikely to be directly transferable to the developing country context.

But with the huge potential of broadband Internet for economic growth and development, developing countries can hardly afford to wait until there are more studies showing clear evidence, as they are already lagging behind the advanced nations in regards to ICT. Most developing countries recognize this reality and are keen to promote broadband Internet development, and many are developing national broadband strategies or policies.

In terms of reaping the benefits of broadband in rural areas and among poorer population groups - which is the concern of a universal access and service policy (UAS), it is not necessarily clear how to proceed, how much to invest, what the required inputs are, what the results are and more importantly, what the required additional framework conditions are.

Nevertheless, some guidance can be given in regards to how each country can tailor the broadband and ICT strategy to their objectives and situation, as follows:

Piloting of broadband ICT projects

Piloting projects is a good approach that allows for the testing of working hypotheses of required input, output, outcome, efficiencies and required additional components.

Consider complementary activities

Any UAS broadband strategy should coordinate with other government ministries and non-government activities and programmes, which can bring a range of complementary activities. These include:

- Public awareness, training and skills development;
- ICT deployment in the education;
- Health sector
- e-Government;
- Environment and emissions reduction;
- Regulatory improvements;
- Development and expansion of ICT business opportunities; and
- Expanded ICT and electricity infrastructure.

Pre-conditions for benefits from ICT development

A certain level of complementary activity and investment should be considered as essential pre-conditions to the effectiveness of ICT and broadband development. For example:

- Reliable 24 hour commercial power supply is generally required for the use of computers and Internet access to be prevalent and beneficial;
- School Internet access projects generally need the pre-condition of the national or provincial education authorities to develop a school computerization and networking programme, a computer lab, teacher training, and the specific institution of an IT curriculum, and relevant national content;
- Promotion of computerization and Internet skills within all government levels, especially including local government and local public health and education institutions;
- Promotion of tele-working, e-government, e-banking, and conducting other activities on-line to offset emissions generated through travel.

Commercial reality and targeting of growth areas first

UAS deployment strategies for ICT services need to be carefully tailored, with the application of smart subsidy, to harness the potential for commercial sustainability and beneficial impact in critical growth areas. This might entail the following components:

- Internet points of presence (POPs) in district centres and population concentrations which have administrative, health, non-government, community broadcast and educational institutions, as well as businesses where sufficient demand will exist to sustain ISPs' business development;
- Public access centres (cyber cafés, telecentres or information centres) in those same localities, to ensure access to the services for these populations and those of the nearby surrounding communities; and
- Subsidized Internet access for schools and other vanguard institutions that serve and train the coming generation of active ICT users.

END NOTES:

1. *Massachusetts Institute of Technology (MIT) Report: Measuring Broadband's Economic Impact, 2006*
http://cfp.mit.edu/publications/CFP_Papers/Measuring_bb_econ_impact-final.pdf
2. *Executive Summary pg 30, World Telecommunication/ICT Development Report 2006: Measuring ICT for social and economic development, ITU*, http://www.itu.int/dms_pub/itu-d/opb/ind/D-IND-WTDR-2006-SUM-PDF-E.pdf
3. *Technical assistance in bridging the "digital divide": A Cost Benefit Analysis for Broadband connectivity in Europe, EC / European Space Agency 2004*, http://ec.europa.eu/information_society/eeurope/i2010/docs/implementation/pwc_final_report.pdf. This study looked at the extent of broadband in Europe, its cost, the technologies used to support it, technical solutions, and the costs and benefits of broadband to the population.

4. *Massachusetts Institute of Technology (MIT) Report: Measuring Broadband's Economic Impact, 2006*
http://cfp.mit.edu/publications/CFP_Papers/Measuring_bb_econ_impact-final.pdf. The analysis measured the impact of already-deployed broadband technologies by applying controlled econometric techniques to data on broadband availability and economic performance for the entire U.S.
5. *Executive Summary pg 3, World Telecommunication/ICT Development Report 2006: Measuring ICT for social and economic development, ITU*, http://www.itu.int/ITU-D/ict/publications/wtdr_06/index.html

6.4 Prioritization of USA projects

There are several approaches to assessing or analysing a programme's socio-economic impact or to prioritizing between several universal access and service (UAS) projects. They are as follows:

- Qualitative approach;
- Quantitative approach, using Net-Present Value (NPV) or Internal Rate of Return (IRR) analysis;
- Comparative subsidy analysis; and
- Subsidy cost per beneficiary comparisons.

Each of these approaches lends itself to certain types of projects. The qualitative approach might be best employed for pilot projects or slightly larger ICT projects for which it is difficult to estimate hard market data such as costs and revenues. This approach requires some field investigations, and also benefits from using data or experiences, gained in similar projects in comparable countries. While a qualitative assessment will not readily lend itself to a simple ranking, it can help to prioritize alternatives projects, based on an assessment of whether and how closely they meet government and developmental goals. The qualitative approach is presented in [Section 6.4.1](#).

The quantitative approach, using economic valuation, outlined in [Section 6.4.2](#), is an approach which has been widely used in telecommunications development projects in the past, for example by Chile's Fondo de Telecomunicaciones (FDT). However, it is now better understood that UAS telecommunications projects require less economic justification or analysis, but rather a financial estimation of commercial viability and subsidy requirement. A simpler methodology that uses subsidy analysis is described in [Section 6.4.3](#), and a subsidy cost per beneficiary comparison is illustrated in [Section 6.4.4](#).

In the light of backbone and broadband infrastructure projects, the NPV analysis might regain some importance, though the precise means of applying quantitative economic valuations to either kind of project is not clear at this time.

In some cases it will be most sensible to prioritize projects in order of size of population reached, or required subsidy per targeted person, with the lowest subsidy per person having highest priority. This yields maximum impact at minimum cost.

6.4.1 Qualitative approach

The qualitative analysis is best used for ICT services projects where cost and revenues are not easily known or predictable, and other methods are therefore difficult to apply. Nevertheless, it ideally combines a market (financial and commercial) and the socio-economic perspective, i.e., both user needs and demand as well as developmental rationale and impact. Projects that have these two aspects in balance are the most likely to succeed. On the other hand, projects that skip the market side and seek justification based solely on socio-economic and developmental cases can face sustainability problems.

- The basic issues to be addressed qualitatively are summarised by the following two tables:
- Table A provides a checklist to define the project's core ideas, values and approach in a descriptive manner, covering the overall developmental rationale and justification.
- Table B captures a more market-oriented view of the project's deliverables, their viability, and the hurdles that may be faced either at implementation or with long term sustainability.

The combination of the qualitative data summarized through these checklists allow an understanding of the project's impacts.

Table A – Developmental rationale	
Vision and objective	- What is the project's core idea, specific objectives and key outputs? - Describe the before/after picture (E.g. 25 institutions serving rural communities and addressing specific social issues will have broadband access to the Internet through five new regional Internet POPs.)
General development focus	- Is the project consistent with development goals that have been identified by policymakers or other development actors in the country or countries where the project will take place? - Does the project have the potential to influence larger development agendas, within the telecom or ICT sector (e.g. market liberalisation) or further afield (e.g. break new grounds in education or health)? - Will the execution and success of the project promote sustainable and equitable development, and how?
Project beneficiaries	- Is the project targeted on any specific communities, classes of people, income groups, age groups, gender? - How will the project address the needs and demands of its target groups?
Nature of the benefits	- What is the primary nature of the benefits of the project? E.g. access to business information, health information, education, government services. - Will the project have any impact on employment, working conditions or quality of life, and how? - What secondary impacts will the project have – e.g. better delivery of social infrastructure services (e.g. education, health & welfare)? - What will be the effect on culture, values, freedom, democracy, etc.?
Distribution of benefits	- What specific benefits or opportunities will various income classes, especially the poor, enjoy? - Will the project help to empower the poor, vulnerable or disadvantaged groups, and how? - What will be the degree and nature of local participation in the project design, implementation and ownership?
Gender considerations	- Does the design and methodology of the project take into account different gender roles, perspectives, interests, and priorities, and how? - Is the project's potential impact assessed from a perspective that recognises gender inequalities and imbalances, and how? - Will research data, demand and expected impacts be broken down by gender? - Do the project's capacity-building features reflect gender considerations, and how? - What are the specific value of the services to women, e.g. in facilitating better access to information, assistance, credit and business opportunities? These should be cited as specifically as possible. - What is the value and usefulness of the services provided? These should be explained in detail, and the targeted outcomes described.

Source: A rural ICT toolkit for Africa, Andrew Dymond, Sonja Oestmann, infoDev 2003 (updated)

Table B – Market, prices, project sustainability and regulation

1. User need & Demand	- Has the development rationale for the project been confirmed through a baseline study demonstrating people's interests, needs, demand and preferences for the project services? - Does/will the analysis identify the various user groups identified in the project objectives?
2. Services & prices	- How will the project outputs be paid for, and how do the prices charged relate to the cost of supply? - Are prices cost-based? If not, is the problem related to affordability or regulation, or both?
3. Affordability & willingness to pay	- Does the requisite baseline study address affordability and willingness to pay? - What are peoples' opportunity costs to satisfy their communication or information needs, without the project? Have they already demonstrated a willingness to incur these costs (e.g. by travelling), or is the idea of communicating and securing information relatively new? - In the case of government or institutions as users of ICT, what is their willingness or ability to pay for the ICT services, and what are the opportunity costs to provide the end services they are responsible for without the project?
4. Costs	Does the project deliver the proposed services in the most cost-effective way possible? E.g. Has the most cost-effective technology been considered/ selected?
5. Policy & Regulation	- Are the prices/ tariffs to be charged regulated by government? What flexibility exists? - Are there any regulatory impediments that constrain the project from delivering the services in the most cost-effective manner? (E.g. technology choice or licensing, enforcement of interconnection with incumbent operator, etc.)

Source: *A rural ICT toolkit for Africa*, Andrew Dymond, Sonja Oestmann, *infoDev* 2003 (updated)

6.4.2 Quantitative socio-economic analysis using NPV

A quantitative socio-economic analysis using net present value (NPV) requires the analyst to:

- Carry out a normal cash flow analysis using capital and operating costs and revenues, as described in Section 6.2. to calculate a NPV or financial internal rate of return (IRR) in the normal way;
- Adjust the revenue flows to 'economic values' by:
 - estimating the economic benefits received by recipients of the project's output/ services over and above the price they pay for the services;
 - using this information to derive an 'economic valuation factor (EVF)', and
 - using the EVF as a multiplier to convert the project's financial revenue streams into economic benefit streams. The methodology for calculating EVFs can be found in the Practice Note Economic Evaluation Factor.
- Adjust the costs using 'shadow prices' which reflect the economic value of the various cost items, such as skilled and unskilled labour, imported technology, etc., and eliminate taxes (which are not a cost to the economy) [\[1\]](#);
- Recalculate the project's NPV or IRR using the adjusted economic values to calculate the economic performance – e.g., an economic NPV or IRR.

Table C provides a detailed checklist for assessing benefits for projects, if the project lends itself to such an analysis, and assisting with deriving the required inputs for the economic evaluation above. It requires on-the-ground investigations, which can be a component of a demand study. Only the questions relevant to the case under consideration need be answered.

Table C – Economic valuations

1. Identify the specific user groups	• Arrange into categories, e.g. 20% male farmers, 10% female heads of household, 20% schoolteachers, 20% government workers, 20% students, 10% micro-enterprise women. • Refine the categories to reflect groups which can be identified economically, as discussed below
2. Estimate the realistic monetary or economic benefits enjoyed from the project by specific private user groups (include individuals, micro-enterprises and small businesses).	• E.g. if making a call from a public phone, securing information from a telecentre, or undertaking an tele-educational course reduces lost time or out-of-pocket expense due to less travel, list these as case examples. • For the most identifiable cases, estimate the size of benefit received (the \$ saved compared to the alternative way of communicating– i.e. the "opportunity cost") compared to the price paid for the telecom or ICT service. • Estimate how "typical" these cases are – i.e., do they represent the majority of users, the average user, or a small minority? • Prepare a profile of case types, matching user categories if possible. • Estimate some typical 'benefit-to-cost' ratios (i.e., benefit received versus price paid for the telecom or ICT service)
3. Make estimates of benefits received from small and medium sized businesses	• E.g. a business owner might say "I pay \$50 per month for this service, but my benefits are five times this amount in saved time, more efficient inventory control, and sales that I would not be able to make without the service." • Estimate how typical this story is amongst users of the service, and estimate a typical range. • Estimate typical benefit-to-cost ratios. • Estimate how much the business owners would be willing to pay for the service if the price were increased. (This might be an indication of how real the benefits really are.)
4. Estimate the realistic monetary or economic benefits enjoyed by institutional or government users	• What programs are enhanced, enabled or improved as a result of the telecom or ICT service? • Who are the beneficiaries of the organisation's program(s)? • What are the savings in terms of time, transportation cost, staff efficiency as a result of the ICT service? • Estimate typical benefit-to-cost ratios. • If the organisation does not have to fully pay for the service, estimate through interview with management what it might be willing to pay.
5. Identify locality specific factors	• Determine if the benefit to cost ratios estimates in 2, 3 & 4 above vary depending on locality size and type, distance from the main population centre, etc., • Identify benefit-to-cost benchmark categories for a limited number of locality types if possible
6. Place an "economic value" on the revenue stream of the project	• From the estimated benefits or benefit-to-cost ratios received by the users of the telephone or other ICT services, as estimated in steps 1-5 above, calculate a composite economic valuation of the revenue stream.
7. Identify other benefits or externalities from the project	• Add an estimate of benefits received by non-users, who will be the recipients of services enhanced by the institutional ICT users. (This can typically only be described qualitatively.)

Source: A rural ICT toolkit for Africa, Andrew Dymond, Sonja Oestmann, infoDev 2003 (updated)

In principle, UAS projects with a positive economic NPV but which have a negative financial NPV (i.e., needing subsidy for financial sustainability) should be added to the pool of projects to be offered for subsidy. They may be arranged in order of benefit to cost (benefit to subsidy) ratio or economic NPV, or in any other strategic way.

Projects with negative economic NPV at the desired minimum rate of return (i.e., the cost of capital) should not be undertaken, as their returns in terms of development and economic benefits to the wider economy are likely to be marginal.

END NOTES

1. For the purpose of simplification, the methodology used in this Toolkit does not deal with shadow pricing of costs (which are often a somewhat academic exercise).

6.4.3 Ranking using the findings of a financial subsidy analysis

An increasingly practical way to prioritize projects is through the level of expected private investment compared to subsidy. Some projects require less than 30 per cent subsidization and are therefore likely to generate as least twice the amount of subsidy in capital investment.

Whereas universal access and service (UAS) programmes are geared towards extending the reach of markets into areas where service providers may not reach without subsidy, the principle of smart subsidy requires consideration of service sustainability in the medium to long run [1]. Project viability in the context of subsidy requirements can often be summarized as shown in the following table.

Table: Classification of project viability	
Category	Description
1	Definitely commercially viable & will be served by existing operators soon, no subsidy required
2	Commercially viable under optimistic assumptions regarding affordability and costs, but marginal. May be strategically valuable to operators – e.g., extending range along important transportation routes.
3	Commercially viable with favourable regulatory or fiscal conditions (e.g., asymmetric interconnection, tax or import duty incentives) and/or subsidy requirement is less than approx. 33 per cent of Capex costs
4	Marginal viability, but viable with moderate subsidy (e.g. covering less than 50 per cent of Capex costs)
5	Definitely unviable without major subsidy (e.g. requiring more than 50 per cent of Capex costs and/or required operating cost subsidy)

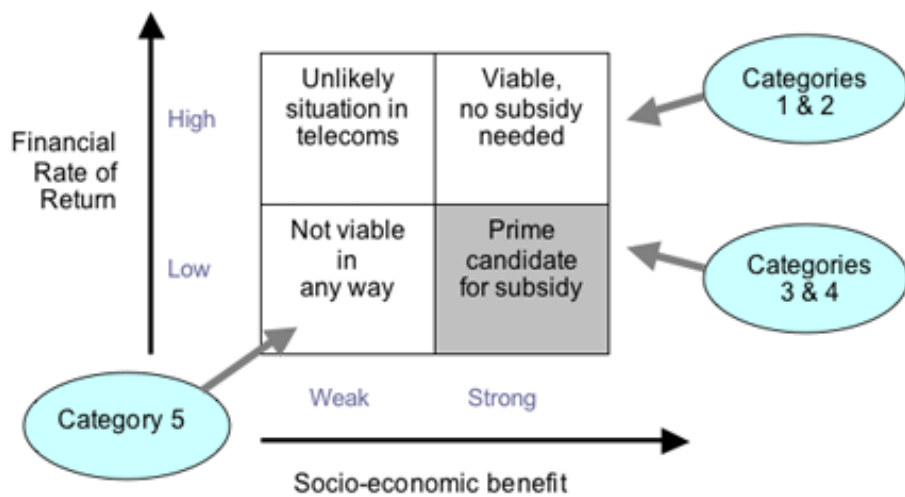
Source: Intelcon Research & Consultancy Ltd.

The methodology for making these assessments is described in [Section 6.2](#) Modelling costs, viability and subsidy requirements.

In general, projects and service locations in categories 3 and 4 are the most attractive for UAS programmes since they address areas that are not likely to be served in the short to medium term commercially, yet have a good chance of becoming sustainable and commercially viable in the long run after application of a smart subsidy. They also successfully leverage private investment beyond the amount of subsidy offered. This principle can and should be considered as the most desirable, whether the project is for telephony into new areas, ICT service development or broadband backbone infrastructure, as the principle of commercial viability is generally the only that can guarantee sustainability. Communications projects in these categories also typically carry socio-economic benefits that exceed the level of subsidy provided.

The figure below illustrates how financial viability and socio-economic benefit viability can be compared when considering project priorities.

Project priorities



Source: Intelcon Research & Consultancy Ltd.

Projects in categories 1 and 2 usually do not need subsidy. Even if the geographical areas in this category are not presently covered, they may be contiguous with existing service areas or represent the next logical step in national infrastructure build-out. They will be reached by the market, sooner or later.

Projects in category 5 (low financial return and socio-economically weak because they might reach so few people) carry with them the risk that even after receipt of a one-time subsidy, the service provider may not be able to continue profitably in the long run, as the operating costs may be too high and revenues too low because of low population. On balance, if the usage is low, the socio-economic benefits may be considerably below the level of subsidy required, which means they may be hard to justify. However, since this category may apply to the last 3 to 5 per cent of the population but sometimes up to 25 or 30 per cent of a country's land area, they could justify the government deciding to subsidize them for political reasons, or they could become viable at a later stage in the UAS programme, after the more viable areas have been reached.

In the case of telephony access, some areas in category 5 can also be packaged with service areas conforming to category 3 or 4, in order to increase coverage to less viable communities.

The final selection of and prioritization of projects, as well as subsidy requirements, will usually involve a blend of qualitative and quantitative regional ranking as well as financial analysis to determine apparent commercial viability and to estimate the financial gap, which is the one-time subsidy required to entice operators to meet UAS targets.

The Practice Note *Malawi Pilot – Prioritizing and selecting districts for UAS project* provides an insight into the use of the above methodology for regional prioritization.

END NOTES

1. Under the concept of developing a sustainable UAS investment, a smart subsidy is the term used to describe an initial subsidy (usually given on a once-only basis) that is designed to be results-oriented, does not distort the market, and encourages cost minimization and growth of the market. It helps to kick start a project or service, with the ultimate objective of the programme becoming commercially viable, whereas without the subsidy investors might otherwise have been reluctant to invest. No further subsidies are needed if the service targets (e.g., the market penetration and level of access) are set realistically, with medium term commercial viability in view. The gaps model, which explains the smart subsidy principle, was first introduced and explained in Chapter 1, [Section 1.3.3](#) Market Gaps and universal access policy.

6.4.4 Subsidy cost per beneficiary

Having evaluated the amount of subsidy required (as per the methodology in [Section 6.2](#)) in the various projects that make up a universal access and service (UAS) programme, one way to assess, evaluate and rank them is to identify the costs (in terms of required subsidy) per beneficiary or cost per community served. It is appropriate to make cross-country and, more importantly, internal provincial or district comparisons when evaluating UAS costs, in order to help decide how reasonable a programme appears to be.

Telephony fixed line costs

Although less relevant as a guide for UA telephony competitions today, the table in [Section 3.2.1](#) described the cost of the universal access (UA) programmes in the three leading Latin American countries in terms of subsidy per locality for both public village telephones, telecentres and school Internet programmes.

A recent study preparing the first UA pilot project for Mongolia compared Mongolia's costs with the Latin American examples (since the country's geography is similar to the Latin American examples in terms of remote regions) and at least one of Mongolia's programmes involved primarily UA in remote areas.

The table summarizes the approximate projected subsidy per person for Mongolia's 2006 public access network deployment to remote nomadic herder areas. The expected subsidy costs per community were projected to range between USD 5,100 and USD 7,200 per station. The table shows an overall expected average of approximately USD 7.69 per person, though ranging from USD 5.28 to USD 11.86 in the various locations.

Soum	Under-Ulaan	Tariat	Khangai	Jinst	Bayant sagaan	Khure maal	Total
Total district population	6,068	5,858	3,554	2,352	4,526	2,466	24,824
Nomadic herder population	4,700	4,543	2,895	1,855	3,999	1,950	19,942
Expected subsidy per herder (USD)	6.64	5.28	9.67	11.86	6.63	11.08	7.69

Source: Cost-benefit analysis on Mongolia OBA Pilot Program of the Universal Access Strategy, Report submitted to the Global Partnership on Output-based Aid and World Bank, January 2006, Intelcon

These estimates compared favourably with other fixed network competitions in similarly remote and mountainous areas of the world, of which Chile and Peru were the prime examples. The Chilean competitions awarded subsidies in the range USD 2,256 to USD 12,727 per locality and between USD 2.88 and USD 45.50 per inhabitant (the first round of competition was for terrestrial wireless, while the later rounds included more satellite solutions and were comparable with Mongolia's).

Table: Experience of Chile's UA Subsidy Competitions						
Year	Population still without telephone (% of country)		Locations awarded	Total Subsidies awarded (USD M)	Subsidy per location (USD)	Subsidy per inhabitant (USD)
	Before	After				
1995-96	15%	9%	2,358	2.88	1,220	2.88
1997	9%	4%	2,146	7.28	3,390	9.45
1998	4%	2%	858	5.19	6,320	22.57
1999	2%	1.3%	554	4.58	8,270	30.53
2000	1.3%	1%	143	1.82	12,730	45.50
Total 1995-2000	15%	1%	6,059	21.8	3,600	9.91

Source: Cost-benefit analysis on Mongolia OBA Pilot Program of the Universal Access Strategy, Report submitted to the Global Partnership on Output-based Aid (GPOBA) and World Bank, January 2006, Intelcon Research & Consultancy Ltd.

The following table summarizes the universal access programme of the Telecommunications Investment Fund (FITEL) in Peru. Each project had slightly different features and characteristics. FITEL summarized its projects in terms of the population served and the reduction in average access distance for the populace to reach a public telephone.

Table: Summary of the FITEL Programme				
Item	FITEL I (1998)	FITEL II (1999)	FITEL III (2000/1)	FITEL IV (2000/1)
Approx. No. of Sites	213	2,170	2,520	1,614
Population (Millions)	0.14	1.6	2.1	2.9
Subsidy (USD Millions)	5.1	12.1	30.7	11.4
Population / site	689	758	827	1,822
Subsidy / site USD	23,937	5,575	12,163	7,061
Subsidy / per capita USD	34.74	7.36	14.71	3.88
Avg. Access Distance (prior)	90km	54km	24km	NA ⁽²⁾
Avg. Access Distance (post)	5km	8km	4km	NA

Source: Universal Access Program Assessment Report: Private sector provision of telecommunications services in rural and peri-urban areas in Peru, submitted to World Bank Public-private Advisory Facility (PPIAF), Sept 2003, Intelcon Research & Consultancy Ltd.

Overall, the Peruvian subsidies per site ranged from about USD 5,600 to USD 12,000, excluding FITEL I [1]. These values are comparable with the Chilean subsidies awarded per locality during the same period and the FITEL II and FITEL III projects illustrated the same effect as seen in Chile; the subsidy rising with time, going from more competitive to less competitive conditions and more remote, high cost and poorer areas. The FITEL IV Programme did not have the same access distance reduction effect as the earlier projects because it was designed to provide an additional public phone in locations that already had a public phone.

Mobile costs

Uganda was the first country to use competitive tendering for technology neutral solutions, won by mobile operators, through its Uganda's Rural Communications Development Fund (RCDF). The table illustrates that the subsidy amounts in its first country-wide competition were between USD 2.64 and USD 4.29 per person served. The final competitive bids and cost per person were approximately 40 per cent below these projections. Each public access phone served approximately 2,500 inhabitants, while several thousand rural private users were also served on the same networks, which explains the much lower cost per person and illustrates the recent trend towards universal access and service (UAS) since the ascendancy of mobile.

Table : Uganda RCDF Telephony subsidy amounts					
UA Region	Maximum UA Subsidy Amount (USD)	No. of localities	Subsidy per locality (USD)	Unserved pop'n	Subsidy per person (USD)
UA Region A: West & North-West	2,935,000	392	7,487	684,365	4.29
UA Region B: Central & North-Central	1,778,888	542	3,282	674,381	2.64
UA Region C: East & North-East	2,025,000	618	3,277	602,198	3.36
Total	6,738,888	1,552	4,342	1,960,944	3.44

Source: Cost-benefit analysis on Mongolia OBA Pilot Program of the Universal Access Strategy, Report submitted to the Global Partnership on Output-based Aid and World Bank, January 2006, Intelcon Research & Consultancy Ltd.

The first pilot projects of Nigeria's Universal Service Provision Fund (USPF) also saw relatively low subsidy costs per person as shown in the following table. These costs included the provision of Internet POPs and public Internet cafés at the Local Government Authority (LGA) headquarters.

Table : Nigeria USPF Pilot subsidy estimations					
UA Region	Maximum UA Subsidy Amount (USD)	No. of localities	Subsidy per locality (USD)	Population to be served	Subsidy per person (USD)
Pilot 1: North East Region	2,160,000	168	12,857	918,000	2.35
Pilot 2: North Central Region	2,669,000	139	19,201	731,600	3.65
Pilot 3: South-South Region	1,412,070	70	20,172	694,000	2.03
Total	6,241,070	377	16,555	2,343,600	2.66

Source: Cost-benefit analysis on Mongolia OBA Pilot Program of the Universal Access Strategy, Report submitted to the Global Partnership on Output-based Aid and World Bank, January 2006, Intelcon Research & Consultancy Ltd.

Internet POP and ICT programme costs

Internet POP and public access projects in district centres which already have digital backbones serving base station towers, typically cost in the range USD 2 to USD 20 per local inhabitant.

The Uganda RCDF has implemented Internet POPs at district centres. These were designed to provide vanguard institutions (e.g., schools, colleges, hospitals, NGOs), government offices and businesses with high-speed wireless service on a commercial demand basis. The average subsidy per POP was around USD 30,000, serving a typical district centre population of 15,000. In addition, one telecentre per district is being funded to a maximum subsidy of approximately USD 25,000. The total average Internet and telecentre subsidy under the RCDF, therefore, averages USD 3 to USD 4 per inhabitant, though the most remote and sparsely populated district centres required much higher subsidies ranging up to USD 20 per inhabitant.

Initial costs for remote district centre communications in the Mongolian universal access (UA) pilot programme offered joint subsidies for mobile telephony, Internet POP, public access and free access for the school for three years. Subsidies ranged from USD 16,000 to USD 40,000 for population centres of only 1,000 people. However, from the pilot experience described in the reference documents Output-Based Aid in Mongolia: Expanding telecommunications services to rural areas and Cost-benefit analysis on Mongolia OBA Pilot Program of the Universal Access Strategy (Section 6.3.3), telephony and Internet/ICT competitions are now being bid separately, with the Internet POPs attempted only for the largest and most well-connected centres. The subsidies are expected to range between USD 40,000 to USD 80,000 per centre, i.e., ranging between USD 30 to USD 80 per inhabitant, including all Internet and ICT components.

As can be seen in all these examples above, subsidy cost per person and or per locality can vary considerably. These indicators are valuable tools to prioritize provinces or districts or projects, and help to decide how reasonable a programme appears to be.

END NOTES

1. The FITEL 1 Project was abnormal in several respects, including government ownership of the infrastructure, and cannot be taken as either best practice or typical.

7 Competing for UAS subsidies

CHAPTER 7 TRANSLATIONS

 [Version française \(PDF\)](#)

 [Versión Española \(PDF\)](#)

This chapter describes the key tender design considerations and the protocol for holding a competitive tender to allocate subsidies to a winning operator or service provider in exchange for universal access and service (UAS) provision. This process, which is almost always used in conjunction with a Universal Access and Service Fund (UASF), can also be used by international or national donors, or industry regulators, using government or other sources outside of UASFs, to supply subsidies or grants.

The main objectives of a competitive bid are to select a qualified organization (with experience, personnel, track record, etc) that has the necessary capacity (e.g., capital, expertise, manpower, etc.), the long-term motivation (through sustainability or profitable business), and the minimum requirements for funds.

Subsidizing ICT projects brings certain risks. These potential risks include:

- Distorting the market;
- Creating dependence on ongoing funding;
- Potential abuse of funds;
- Favouritism; and
- Project failures which waste resources.

To avoid these funding pitfalls, smart subsidy has emerged as a best practice approach. Smart subsidy is considered to be a part of a broader approach to government subsidies known as Output-Based Aid (OBA). The concepts are described in more detail in [Section 1.3.3](#) and [Section 3.2](#). The OBA approach delegates service delivery to the for-profit or non-profit private sector under contracts that tie payments to the outputs or results that are actually delivered to target beneficiaries [\[1\]](#).

A smart subsidy:

- Should be a one-time result-oriented subsidy awarded typically to a private sector operator or entrepreneur, in some cases a commercially constituted government-owned entity might also be possible;
- Should not distort the market;
- Should encourage cost savings and market growth;
- Should kick start a project or service with the objective of ultimately seeing the programme become commercially viable; and
- Should encourage service development in regions where, without the subsidy, investors might otherwise have been reluctant to invest.

Smart subsidies address the experience of some earlier funded projects that had ill-designed tenders which resulted in wasted resources, created bottlenecks in development, and generally were counter-productive. The following are guidelines for the use of smarter subsidies:

- Operate according to pre-established clear, explicit rules that are transparent and do not create distortions in the market;
- Link subsidies to optimal results;
- Support cost-minimization incentives; and
- Facilitate good governance.

The following design parameters for the competitive bidding strategy (discussed in [Section 7.1](#)), bidding and subsidy allocation process (described in [Section 7.2](#)) and inspection, payment, monitoring and evaluation process (elaborated in [Section 7.3](#)) illustrate how the smart subsidy and OBA principles are implemented in practice.

END NOTES

1. See for details “Contracting for public services: Output-based aid and its applications” Edited by Penelope J. Brook and Suzanne M. Smith, published by Rapid Response Unit of the World Bank Group, 2001.

7.1 Design of the UAS bidding strategy

The competitive subsidy bidding approach is described in the following sections. This approach is appropriate for universal access and service (UAS) projects that involve:

- Large capital investments in networks;
- Large sums of subsidies to be disbursed (e.g., starting from several hundred thousand dollars to several million); and
- Companies as subsidy recipients.

The reasons to use competitive bidding in the above types of projects are that:

- The investment climate would be affected negatively if the regulator or government were not using a competitive process and were to favour a certain company; and
- Organizing a competitive tender involves time and costs and thus is only efficient if large sums are involved.

As discussed earlier, the development of the UAS policy requires close consultation with the industry. The same holds true for developing UAS bidding strategies. The various steps of the UAS bidding design process are as follows:

- Formulate the bid objectives and desired outcomes;
- Articulate bidder eligibility, UAS areas, and separate or bundled UAS service provision;
- Present the UAS bidding strategy and detailed projects to potential bidders for discussion and integration of feedback;
- Conduct detailed design of the bidding process, including key parameters of the subsidy contract and license;
- Prepare detailed bidding documents; and
- Ensure a transparent bidding process.

The formulation of bid objectives and desired outcomes is based on each country's UAS policy. In addition to achieving the UAS targets, bid objectives could include minimizing subsidies or increasing competition in the market. Decisions on who is eligible for participation in the competitive tender for subsidies have an impact on the objectives and desired outcomes. This is discussed in [Section 7.1.1](#).

[Section 7.1.2](#) discusses how UAS area bidding lots can be determined and the implications of grouping regions and programmes.

[Section 7.1.3](#) presents required decisions on the design of the bidding process itself, including key parameters of the contract and license.

[Section 7.1.4](#) outlines the key elements of the bidding documents that are used in the competitive tender for UAS subsidies.

[Section 7.1.5](#) addresses how competitive procedures might be adapted for smaller ICT projects or how other approaches can be used.

7.1.1 Determining eligibility for UAS competitions

The following key questions relate to the eligibility of universal access and service (UAS) competitions and subsidy disbursements:

- Are government-owned companies eligible to participate in UAS competitions; and
- Can new entrants and smaller players compete for subsidies or are subsidies only available to companies that are already licensed and contributing to the Universal Access and Service Fund (UASF)?

Government-owned companies

In some countries certain operators, typically the incumbent, is still whole or partially government-owned. This raises the question whether this type of entity is eligible to take part in a subsidy competition for UAS services.

The main concern with government owned companies competing for subsidy, is the potential for conflict of interest as a UAS competition is the implementation of government policy. This raises the question of whether the government can be impartial in awarding a UAS subsidy if a participating firm is owned or partially owned by the government.

This scenario exists in several countries, for example, in India where Bharat Sanchar Nigam Ltd (BSNL) is government-owned, and the Department of Telecommunications (DoT) within the Ministry of Communications and Information Technology manages the Universal Service Obligation Fund (USOF), and has awarded subsidies to BSNL, among others.

Even when government is impartial, there might still be the perception of a potential conflict of interest. However, government-owned companies can and should be allowed to participate in UAS competitions, provided they are also contributors to the UASF, and provided there are sufficient safeguards in place to ensure that competitions are run and awarded impartially and free from conflict of interest. One such safeguard is to have the competitive bid conducted by the industry regulator. The industry regulator, typically considered more independent than a ministry and one step-removed from government, should implement UAS competitive bids when government-owned companies are involved. This is the most common practice in countries with a UASF.

Existing versus new entrant companies

In some UAS competitions, currently licensed local operators that contribute to a UASF, or who are asked to contribute to a UASF, believe that only contributors should be eligible to participate. There is an alternative view, however, espoused by the World Bank and other International Finance Institutions (IFI) and donors, that UAS competitions must be open for all players, including foreign and local new entrants.

Both these scenarios have merit. Currently licensed local operators point out that allowing only contributors to a UASF to compete and receive subsidies, is a fair scenario that in fact results in a broader buy-in to a UASF among existing operators. The alternative view, on the other hand, stresses openness, an equal-playing field and increased competition.

It depends on the specific country circumstances as to which scenario might be more beneficial. An open UAS tender is a good opportunity to increase overall competition in the market place by encouraging new players to enter. New entrants might be restricted to a certain UAS area first (e.g., rural), but can be promised a national licence at a later stage (e.g., within two to three years). Bidding documents should include licences for the new potential entrants, or the bidding documents should contain the key terms and conditions of the licences offered to the winning bidder.

If the specific market has a sufficient and satisfactory level of competition and constraints on scarce resources, in particular spectrum, make it impractical to license new operators to provide the required service, the bid could be limited to the existing local licensees and contributors to the UASF. In general, existing operators are likely to be in a better position than local or foreign new entrants to win a UAS competitive bid as they already know the market and have an existing network and service provision operation in the country which they may only need to expand, while new entrants need to set up a network and operations from scratch. Nevertheless, new entrants can win UAS tenders if either the local players are uninterested in participating, or if the new entrant is willing to make a low bid as a part of a long-term strategy for entering the market. A similar situation may emerge when new low cost technologies become available that may render irrelevant any potential competitive advantage that existing local operators may have acquired by virtue of their presence in the market.

It is also conceivable to design different eligibility rules within the overall UAS programme that is a compromise between new entrants and existing companies e.g., new entrants are allowed to compete, but limited for certain projects or areas.

It must be noted that, in countries with limited competition due to a small number of licensed operators, opening up the UAS tender rules to new entrants may have positive competitive spill-over effects beyond the UAS tender regions, since it may yield a viable new competitor in the whole market.

7.1.2 Developing UAS bidding strategy and deciding on bidding lots

Deciding on the grouping of universal access and service (UAS) areas into bidding lots is one of the most strategically important tasks when preparing for subsidy tender. UAS bidding lots represent the grouping of areas within a country for UAS projects. For example in Uganda, the country was divided into three regions for the public access phone competitive tender.

There are several considerations relating to developing UAS bidding lots. Choosing which grouping is best for a particular country and which programme depends on the UAS objectives and current UAS status of a country. The main considerations when developing UAS bidding lots are as follows:

Maximising and sustaining competition

Companies' appetites for aggressive bidding, are directly related to their strategic objectives (e.g., expansion plans, to secure licences). The division of UAS territories into several areas or regions, and the opportunity to bid for multiple areas, allows bidders to assemble territorial blocks according to corporate interests.

When a UAS competitive tender allows new entrants and offers new licences, it also provides an opportunity for new entrants to assemble major national holdings through aggressive pricing of their bids. In one example from Chile, a successful bidder accepted zero subsidies in order to get a foothold into the market, develop its targeted territory, and secure long-term control of radio frequencies (For details on Chile's experience see the reference document Closing the gap to access to rural communications and [Section 3.2.1](#) including the practice note on Chile).

Once the market is more mature and fewer areas and groups remain unserved, or the potential for new competitive entry declines, companies may not be as motivated to bid. This risk can be reduced, but not necessarily eliminated altogether, by fund managers considering competitive market interests when they design and group UAS areas. This means that they should assess the apparent commercial interests of the players likely to bid, and group the UAS areas in such a way as to increase attractiveness and maximise the number of competitors.

The problem of the most marginal localities

Some UAS territories, including those of strategic importance, are much less viable than territories containing broad opportunities for

service growth and diversification or wider technology choice. This is seen especially in some very remote areas that can only be reached by satellite technology (e.g., the remoter regions of Chile, Mongolia, Peru, Botswana and Russia).

Packaging attractive regions with less-attractive service areas, and by offering larger licence areas (to ensure economies of scale) or perhaps, even applying a higher level of interconnect access charge to reflect the costs of the more remote communities, will help promote operators' interest in serving these marginal regions.

The ideal formula will vary from country to country as careful UAS area grouping is a crucial issue. It could be that ultimately, some funds having to deal with extremely high-cost areas may have to consider operational as well as capital subsidies, to secure long term operator viability. The reference document Output-based aid in Nepal provides one example of how to increase the attractiveness in a very challenging environment.

Economies of scale versus increased choice and flexibility

In 2008, Mongolia offered a high level of flexibility and choice for operators in its competitive UAS bidding process. The tender to provide public access and private telephony in 90 soums (district centres) without adequate services allowed operators to bid for each soum separately. The evaluation was for each separate soum.

The advantage of offering individual bids was that the operators could bid for specific soums, which gave them maximum choice and flexibility. This method of tendering makes it easier for the UASF fund manager who will not need to second guess the strategic interest of operators in the design packages. The potential disadvantages are that operators do not know which and how many soums they might win, and could lose out on economies of scale benefits for a larger region and end up with a very scattered distribution of UAS areas around the country. However, in general the strategy was a great success, as 89 of the 90 soums were awarded on the first round and the bids amounted to less than 70 per cent of the maximum allowable subsidies set by the fund manager.

Limiting dominant positions of a UAS provider

Regardless of whether UAS regions or individual locations are offered, it might be wise to limit how many of the regions or lots any one operator or service provider can win. A reason for this includes the scenario in which a winning bidder defaults on his obligation, then not all areas will be affected (limiting the dependence on a single operator). Another reason is that this scenario creates the opportunity for several operators and service providers to win an area and will increase the acceptance and interest in a competition (i.e., a single powerful operator cannot dominate the bidding).

An example of a bidding process with limits is the tender in Uganda to award Internet Points of Presence (POPs) and Internet cafes in all the district centres. There were 32 district centres to be bid on at the time, but any one operator or ISP could only win a maximum of 10 Internet POPs [\[1\]](#).

Separate or bundled service provision

Another important consideration with regard to designing the bidding strategy is whether to bid certain universal access and service (UAS) requirements separately or bundled. For example in Uganda, the public telephony bid for very 2,500 rural inhabitants was separate from the bid for broadband Internet points of presence (POPs) in 32 district centres around the country. In contrast, in Mongolia's pilot project in Tariat soum (district) and Chuluut soum, wireless voice services, Internet POP, public Internet centre and support for the school to access the Internet was all combined into a single tender for each soum.

Separate or bundled UAS service tenders have each their advantages and disadvantages and the selection of which approach to use depends on the country conditions.

Advantages of the separate service tender approach are:

- The timing of separate tenders can be sequential and spread out over some time, matching fund availability;
- Complexity of the tender is limited as only a single main service needs to be provided;
- Separate tenders allow several (especially smaller) players to participate and increases the inclusiveness of the UASF programme (e.g. Internet service providers can participate in an Internet POP bid, schools can apply themselves for support for Internet access);

Advantages of the bundled service tender approach are:

- The bundling of UAS services increases economies of scale and the attractiveness of the tender; it is therefore useful if individual UAS projects and maximum subsidy offers are small by themselves and might not attract sufficient interest from potential bidders unless they are bundled;
- As the communications industry converges more and licences are technology and service-neutral (i.e., a licensee can use any technology to provide any communications service), bundled UAS bidding might be more appropriate.

Minimizing subsidies needed

In addition to the way UAS bidding lots are designed, there are a few other options which help to minimize the subsidy amount needed by operators:

- Offering free or low cost use of radio frequencies to the winning bidder;

- Allowing the winning bidder to provide other services (i.e., a service-neutral approach); and
- Mandating infrastructure sharing, both for transmission and access such as wireless towers (for details see Section 3.4.6 and its Practice Note Sharing mobile network infrastructure in India).

END NOTES

1. However, the bidding documents allowed two exceptions as follows “the maximum limit of 10 Designated Districts for award to any single Qualified Proponent may be raised by UCC: a) if it would otherwise cause UCC to accept a Subsidy Proposal for a Designated District that is more than 10% higher than the lowest Subsidy Proposal for the Designated District; or b) if the Subsidy Proposals submitted by Qualified Proponents are otherwise insufficient to lead to the award of all 32 Designated Districts.”

7.1.3 Design of bidding process

In addition to strategic decisions about the eligibility of various types of operators and services providers to partake in the competitive universal access and service (UAS) bidding process, discussed in [Section 7.1.1](#), and the strategic design of the UAS bidding lots presented in [Section 7.1.2](#), there are also important decisions to be made on procedural issues of the bidding and key parameters of the contract and licence, discussed in this section.

Pre-qualification required or not

While a pre-qualification requirement is more common in privatizations of incumbent operators, or licence and frequency competitive bids, most UAS subsidy competitions do not require pre-qualification. Pre-qualification adds one more step into the process and thus extends the time required for the bidding process. However, requiring pre-qualification might be helpful in instances when the government is unsure whether and how many national operators have the required qualifications, for example, for a large backbone investment.

One stage or two stage approach

A two-stage bidding approach means that the first request for proposal (RFP) asks for technical proposals from bidders, without prices. The RFP does not contain specific detailed technical requirements, but it is rather designed to elicit innovative approaches from operators. The operators issue technical bids in accordance with their best proposal for providing the service. After having seen the technical bids, the government prepares the second stage detailed bidding documents based on elements it liked from the first-stage technical bids operators submitted. Bidders then respond anew including their financial bid.

A two-stage bidding approach is useful in instances where the government is unsure about a) market response to issues of bundling of areas or services, specific technologies, etc., and b) the specific UAS project design and wishes to be presented with various options of how to do a certain project. Again, typically UAS competitions do not use a two-stage approach to bidding, but each country has to choose in which instances this may be beneficial and outweighs the disadvantage of a longer tender process.

One envelope or two envelope approach

A one envelope approach contains both the technical and financial proposal in a single envelope, while a two envelope approach requires the technical bid and financial bid in separate envelopes. The two-envelope approach means that the technical bid is opened and evaluated first, before the financial bid is opened. The advantage is that the evaluation cannot be influenced by the price of the bidder. In the case of the one-envelope approach, commonly used for UAS competitions, the financial and technical bids are contained in the same envelope and the financial bids are read out at the opening ceremony. The advantage is that bidders know immediately what their competition has bid and there is a high level of transparency. Also, in UAS competitions, what is most important is the subsidy request, while meeting the technical, corporate and services requirements.

Bidder and consortia eligibility criteria

There are typically several bidder and consortia eligibility criteria that must be met. First of all, bidders are required to be free of a conflict of interest. A conflict of interest could be if a bidder is being controlled by an affiliate which is also a bidder; or a bidder that receives or has received any direct or indirect subsidy from another bidder; or a bidder has the same legal representative for purposes of the bid; or participates in more than one bid in this bidding process, or a bidder participated as a consultant in the preparation of the design or technical specifications of the UAS project.

If the bidder is a joint venture, it must meet a number of requirements to be eligible, including it needs to provide a clear allocation of responsibilities among members, have a formal joint venture agreement for a certain duration in place, furnish details of the ownership interests in the joint venture and the financial contributions of each member, and have arrangements in place governing managerial control by the joint venture over the operation of the UAS service provider.

Financing capacity and operational experience

Another eligibility requirement is the financing capacity and operational experience of a bidder. The tender documents should require bidders to demonstrate financial stability, with adequate cash flow and satisfactory net worth. In general, bidders should be required to demonstrate from the record of the previous two years of communications service provision that they are able to deploy and operate the network investments proposed for the UAS operation. The actual requirement in this regard is recommended to be discussed with the

industry and should be set by the UASF at the time of preparation of its tender documents.

Another important qualifying requirement is demonstrating operational experience. The operational experience requirement makes sure that the winning bidder has rolled out and operated a network of a certain size before or has provided very similar or the same services required for the UAS project. Often operational minimum requirements include having operated a telephony or Internet network for a minimum of 2 years, with a minimum number of customers which is similar to the customers in the expected UAS project.

This requirement of operational expertise does not need to deter or limit new entrants. New entrants without operational experience can partner with an entity or person that has that experience. However, in order to make sure that this partner is not just a partner on paper, typically the requirement is that, if the operational expertise of the partner is to qualify the bidder, the partner needs to have at least 25 per cent ownership of the UAS service provider; in some cases this can be higher. It also needs to be demonstrated that the partners' expertise is actually used in the running of the UAS service provider e.g. through a management position.

Incorporation of bidder

Bidding documents can either require that the bidder is incorporated as a company in the respective country at the time of bidding or incorporate within a certain timeframe after bid award e.g., before the contract or licence is signed and made effective. The decision to incorporate at the time of the bid is more onerous to new entrant bidders, as they may not win the bid. However, incorporating after the bid award may take time or could have unexpected complications.

Bidder selection

In most UAS competitions, the bid selection method is that bidders have to comply with the required eligibility criteria, technical, financial and corporate requirements on a simple pass or fail basis. Amongst bidders that pass the eligibility and other detailed requirements, the bidder with the least amount of subsidy requested wins, as long as it is not above the maximum subsidy. There are other methods in which, for example, bidder selection is based on price plus some measure of coverage/investment proposed, or a point system. Both those later methods allow to favour a bidder that provide certain investments or services beyond the minimum requirements, i.e., find a good balance between costs and quality. However, these methods require a higher level of complexity and very careful design so that the bid is still transparent and gives bidders a clear understanding of how to win.

Details of contract or licence

If the winning bidder is an existing national operator, it does not necessarily require a licence, unless it is not authorized to provide some of the required UAS services. However, in case a new entrant is winning the bid, it does need a licence unless the country has already moved to simpler authorizations. Ideally, the bidding documents grant the winner automatically a licence or authorization or at least describe clearly what is required and how long it will take. The same applies for required radio frequency spectrum. Also, the bidding documents should specify whether the provider will have the right to build its own international gateway or not. These decisions have an influence of the likely subsidy requested by bidders. The contract and licence can have differing durations, for example five or ten years. These are elements which need to be decided in advance and be taken into account when calculating the maximum subsidy.

Bid and performance bonds

A bid bond is a bank guarantee provided by the bidder, ranging from 1 to 5 per cent of the maximum subsidy, which the bidder will have to forfeit if the bidder withdraws its bid. The purpose of the bid bond is to deter companies that are not serious bidders.

A performance bond is a bank guarantee over a certain amount of money, provided by the winning bidder that guarantees satisfactory completion of the project or the bidder may lose part or all of the money. Instituting a performance bond will ensure that the operator carries out its UAS requirements as established in its service agreement. The bond provides an additional security to the government, over and above the fact that the subsidy payment will be paid out on a milestone by milestone basis.

In determining the amount of the performance bond, the regulator needs to be conscious of the fact that the performance bond limits the liquidity of the winning bidder or might require the bidder to borrow money. Also, the cost of securing a performance bond might be quite high, especially in developing countries. Thus, as much as possible, the performance bond should be kept to a minimum and ideally be a point of consultation with the industry before finalizing the bidding documents while at the same time provide a level of security and leverage for the government.

It is likely that an appropriate performance bond amount differs from market to market. The amount of the performance bond can be between 10 and 25 per cent, of the subsidy to be awarded.

It is recommended that the performance bond be in the form of a stand-by letter of credit from a reputable bank. This will provide the government with the highest level of certainty that their security will be honored without second-guessing, negotiation or arbitration.

RELATED MATERIALS

[Module 3, "Authorization of Telecommunication/ICT Services", Section 4, "The Competitive Licensing Process"](#)

7.1.4 Competition and application procedures for smaller ICT projects

The bidding documents for a universal access and service (UAS) competition provide complete information on the following four key elements of the UAS bidding programme:

- The context and background of the UAS bid (e.g., the UAS policy, overall programme and government commitment), including a detailed description of the particular UAS project for which the tender is called;
- The detailed requirements and obligations of the UAS service provider (i.e., the winning bidder);
- The rules and procedures of the bidding process itself; and
- A draft contract, also called the UAS Service Agreement, and a draft license (including spectrum license and numbering rights, if required).

In many cases the bidding documents also include specific forms, or templates, to be completed by the participating bidder.

The purpose of including all these elements is to provide the bidders with as complete and comprehensive information as possible in advance of the project. This will solicit well-prepared bids and provide a transparent process with no ambiguities, especially in regards to the bid evaluation and bidders' qualification rules. The following table provides an overview of key topics and elements typically covered in UAS bidding documents.

Table: Overview of key topics and elements covered in bidding documents**Introduction and Overview**

Purpose of bid	e.g., to bring phone service or Internet (or both) to certain areas/ communities; to provide broadband throughout the country
Background	e.g., UAS Policy, government strategy or commitment, overall UAS programme, source of funds
Project overview	Area/ communities to be served, maximum subsidy, services to be provided, tariffs if relevant, time period and other requirements
Time schedule	For bidding process, contract award, project implementation & completion
Contact	Contact persons and details, communication protocol

Requirements, obligations and rights of UAS service provider

Market rights	Extent of freedom which the operator will have to provide additional services, both in the licensed areas and nationally; Usually UAS providers are not granted any exclusivity rights Information on future liberalization dates and plans
Specific licensing provisions	Information for new entrants on what licence they could obtain, to which conditions, if they were awarded the tender, incl. reference to relevant sections of the enabling law and licence fees and levies
Operating area	List the specific areas(s) for the project(s), incl. roll-out period
Minimum service obligations	State in tabular fashion as applicable: - e.g., the number of public telephones required for each area, Internet POPs or any other UAS requirements - e.g., broadband fibre links, interconnection points - e.g., coverage or private service requirements
Quality of service specifications	State all minimum quality standards which must be met such as: - Service availability requirements e.g. 98 per cent - Minimum and mean time to repair - Upload and download speeds for Internet - Bandwidth capacity of broadband networks
Maximum subsidy	Maximum subsidy allowable for each project or area, incl. subsidy payment schedule
Demand data	Information on available demand data or study
Technology specification	While tenders should be technology neutral, in some cases some minor technology requirements might be necessary, such as: - whether or not all transmission media are allowed (e.g., including satellite) - whether or not IP telephony will be allowable
Radio frequencies	Clearly state the policy on radio spectrum usage, radio frequency co-ordination, and the process required for radio frequency approvals - Any frequency bands which are definitely not going to be allowed should be declared - Required radio frequency licence charges and spectrum and numbering fees (where applicable) - Whether or not national roaming is allowed - Whether or not spectrum trading is allowed - Whether or not infrastructure sharing is allowed
Tariffs	Statement of the tariff regulation and rules – typically maximum

	allowable tariffs
Interconnect	State the physical interconnect rules/rights, and any other details of interconnect agreements and regulation (whether or not there is a public Reference Interconnection Offer (RIO); possibility to have geographically asymmetric or other favourable interconnection agreements, etc.) Any scheduled plans for cost-study or potential changes to the interconnect formula and regulation
Monitoring and reporting requirements	Format and timing for reporting of in-service and operational statistics UASF monitoring rights and expectations
Regulation of UAS provider	Any other relevant regulation such as numbering and type approval and the applicable law(s) and regulations
Other legal provisions	Transfer of ownership or change of control of the UAS service provider; access to public and private land; force majeure, dispute resolution; technical auditor; compliance with law (many of these are detailed in the actual contract later)
Rules and procedures of the bidding process	
Proposal preparation	Content & format of proposal Part 1 – Qualification and service proposal (Technical proposal) Part 2 – Subsidy proposal Compliance checklist Bid bond Period of validity of proposals
Qualification of bidder	Applicant eligibility Rules for consortium applicant Financing capacity Operational experience
Bidding process	Pre-proposal (or pre-bid) meeting Communication, comments & requests for clarification Submission of proposal Delivery of proposal Opening of proposals Evaluation period Award and Letter of intent
Evaluation of proposal & selection of successful applicant	Responsiveness of proposals 1) Demanded requirements; required information and bid bond (pre-qualification) 2) Least subsidy request Grounds for rejection of proposals Fraud and corruption Subsequent disqualification and ineligibility
Other provisions	Confidentiality of proposals Use of proposals Cost of proposal and bidding Reservation of rights Legal and formal requirements
Annexes	Proposal forms Bid bond form Compliance checklist Dispute resolution terms Draft contract – UAS Services and Subsidy Agreement

Source: ITU-infoDev ICT Regulation Toolkit – UAS Module

Generally, qualification criteria for bidders should be limited to ensuring applicants have the financial, technical and managerial resources and experience to successfully develop and execute the planned project. It is important to establish clear, rigorous and proportionate qualification criteria, explicitly stated in the bidding documents. Depending on the planned project, the qualifications may vary, but need to be developed by the funding agency. The input from various interested bidders during the consultation process might help to clarify key qualifications, since the most appropriate qualifications may vary from project to project, with market size, etc.

Draft contract

In general, the bidding documents should include as an annex the draft contract, also called a UAS service and subsidy agreement. Details of its typical contents are shown in the following table:

Table: Draft contract – UAS Service and Subsidy Agreement	
Article One	Interpretation (Definitions, extended meanings, currencies, schedules)
Article Two	Provision of UAS services (Implementation arrangements; service availability and quality, and tariffs)
Article Three	Ownership and control
Article Four	Implementation and service failures (penalties, remedies)
Article Five	UAS subsidy payment
Article Six	Performance bond [2]
Article Seven	Insurance
Article Eight	Technical auditor (appointment, role and co-operation)
Article Nine	Reporting
Article Ten	Dispute resolution (escalation process, arbitration or court proceedings, costs)
Article Eleven	Representations and warranties
Article Twelve	Indemnification
Article Thirteen	Force majeure
Article Fourteen	Confidentiality
Article Fifteen	Term and termination (bankruptcy, material breach, remedies)
Article Sixteen	General (governing law, entire agreement, subcontractors, notices, etc)
Article Seventeen	Compliance with environmental laws
Schedule A	Mandatory services, availability and quality specifications
Schedule B	Tariffs and other charges
Schedule C	UAS service area
Schedule D	Implementation and subsidy payment schedule
Schedule E	Material events of default
Schedule F	Performance bond

Source: ITU-infoDev ICT Regulation Toolkit – UAS Module

END NOTES

1. A bid bond is a bank guarantee provided by the bidder, ranging from 1 to 5 per cent of maximum subsidy, which the bidder will have to forfeit if the bidder withdraws its bid. The purpose of the bid bond is to deter companies that are not serious bidders.
2. A performance bond is a bank guarantee, ranging from 10 to 25% of contract value, provided by the winning bidder that guarantees satisfactory completion of the project or the bidder may lose part or all of the money.

7.1.5 Competition and application procedures for smaller ICT projects

The competitive subsidy bidding approach, described in the previous sections, is essentially designed and appropriate for universal access and service (UAS) projects that involve:

- Large capital investments in networks;
- Large sums of subsidies to be disbursed (e.g., starting from several hundred thousand dollars to several millions); and
- Have companies as recipients.

Funding processes for smaller ICT projects can be provided through either a simplified competitive process or an application process for grants. The former, for example, could be used for smaller pilot projects, (e.g., USD 50,000 to USD 200,000). For pilot projects, minimizing cost might not be the foremost objective but rather, the sound testing and evaluation of a particular concept, programme or application in the ICT field. Therefore, a fixed-budget competition process might be used, where the amount of subsidy is given (fixed) and the evaluation is based on specific, pre-published criteria, including a pre-published point system for various elements of the proposal.

An example for when to use a fixed-budget competition award might be the specific funding for Internet access in rural schools (after the backbone infrastructure is available), or for funding the start-up of individual public Internet access points/ telecentres.

Similarly to the process for the competitive bidding, this process would go through the same sequence:

- Formulation of project objective and outcome;
- Public consultation with stakeholders and potential applicants;
- Preparation of application form;
- Transparent invitation process;
- Qualification and evaluation; and
- Bid award.

The Practice Note *Uganda's application process for rural schools to have Internet access* summarises the requirements and process for applicants wishing to provide Internet access to schools and their selection. In general, applicants should be required to prepare an acceptable business plan (or sustainability plan) that outlines the sponsor's vision, objectives, need for funding, and demonstrates long term sustainability. These simplified qualification requirements could be used for similar small projects.

7.2 Bidding & subsidy distribution process

One of the cornerstones of a fair and successful competitive bidding process is transparency. Transparency requires that the process should be conducted openly and that the selection of the winning candidates be based on criteria published in advance. Key features of transparent processes include:

- Advance publication of the bidding documents, with process rules, qualification requirements and selection criteria;
- Separation of qualification and selection processes; and
- Public opening of proposals including separate sealed financial offers from qualified applicants.

The funding agency needs to ensure that participants in the competitive processes, as well as the general public, perceive the process to be fair.

The various steps of the competitive subsidy bidding process are as follows:

- Marketing and official publication of the bidding opportunity as described in [Section 7.2.1](#);
- Conducting a pre-bid meeting that allows bidders to request clarifications and make possible suggestions for modification, discussed in [Section 7.2.2](#); and
- Bid opening, bid evaluation and selection, and subsequent bid award, presented in [Section 7.2.3](#).

In order to allocate subsidies to pilot projects, it is recommendable to require business or sustainability plans, as outlined in [Section 7.2.4](#).

7.2.1 Publicizing the opportunity

Publicizing a competitive bidding opportunity for a universal access and service (UAS) project effectively increases competition and will likely lead to a better outcome (i.e., lower subsidy to be paid, suitable winning bidder).

There are several ways to publicize and market a UAS bidding opportunity. They are as follows:

- By direct invitation to all relevant licence holders within the country. To avoid the perception of favouritism, it is important to notify all the various eligible licence holders. Depending on the number of relevant licence holders, this might be either a practical or impractical approach (i.e., in a small market, it is practical to contact between 10 to 50 licence holders whereas in larger markets this might not be appropriate or effective).
- Placing an announcement in the main national newspaper that has wide circulation among the business community. Ideally, it is placed in two national newspapers or trade journals. Also, it is helpful if the advertisement runs for at least two to three days.
- The bidding opportunity should be published on the web page of the industry regulator, and the relevant ministry could also have links to the announcement. Web-notices, increasingly important, will also help market the opportunity internationally.
- If the bid is open internationally, as discussed in [Section 7.1.1](#), notices or advertisements also need to be placed in international industry or business magazines, newsletters, newspapers and other relevant media. As well, international or regional industry conferences can be used to market a UAS bidding opportunity. It might also be appropriate to contact a certain number of potentially interested international bidders as long as it is more than two or three, in order to avoid any favouritism.

Typically, a country will use a mix of the above options to advertise the bidding opportunity depending upon the specific UAS project and market situation. For example, a small pilot or Internet project below USD 0.5 million might not need to be advertised internationally.

Notices of bidding opportunities can be short but should contain the following vital information:

- Who is calling the competitive tender;
- What area shall be served with which service;
- What is the maximum subsidy offered; and
- Information on how to obtain the official bidding documents.

Public tender documents should be offered for sale to prospective bidders for a specified sum. These are typically kept low for accessibility by interested parties, while at the same time are priced high enough to cover the costs of photocopying, binding, mailing, etc., which will also reduce the number of requests received from non-relevant parties to the bid. The notice and the public tender documents should be issued with at least two months lead time, allowing for bidders to investigate, research and prepare detailed proposals. Depending on the complexity and size of UAS project and whether it is likely that companies need to conduct some site surveys, it might be advisable to give three months lead time.

7.2.2 Pre-bid meeting

At a set date that is specified in the bidding documents, the regulator or Universal Access and Service Fund (UASF) department typically holds a pre-bid meeting. The purpose of the meeting is to allow potential bidders to ask questions and request clarifications. It should also be seen as a last chance to make some modifications to the UAS project and bidding documents, based on suggestions and comments from potential bidders. These changes are likely to be minimal, as the industry had the opportunity to make comments and suggestions during the earlier public consultation process.

The pre-bid meeting can be open to all interested parties, or it can be restricted to companies that purchased the bidding documents. Both options are fine, and deciding on either is more dependent on logistical issues such as location and meeting room size. However, typically all participants are required to register (i.e., provide their name, position, company and contact details). This enables the regulator later to distribute the pre-bid meeting minutes.

Attendance at the pre-bid meeting is typically not mandatory. However, pre-bid meeting minutes which might include amendments to the bidding documents (either to clarify or modify based on feedback) are distributed to all entities that purchased the bidding documents as well as all additional entities that were represented at the pre-bid meeting.

It is helpful to start the discussion at the pre-bid meeting through a brief introductory presentation outlining the main features of the UAS project and the key elements of the bidding process and bidding requirements.

The pre-bid meeting should be held early, e.g., two to three weeks after bid document availability. This allows potential bidders time to

thoroughly review the bidding documents and gives them enough time to prepare the proposal once they have received important clarifications, if applicable. The bidding process should also allow for written requests for clarification or comments, but this should be limited to a certain deadline similar to the process involved in the pre-bid meeting. Answers to written requests are published jointly with the pre-bid meeting minutes, or a separate document is issued and distributed to all potential bidders. Typically the written questions are treated anonymously.

The bidding documents should also include a date at which operators are required to register their intent to participate in the bid or to decline. The written clarifications of the questions can include a reminder of this deadline. While this cannot be legally binding, it is helpful for the regulator to see early on, if there is sufficient interest among operators to bid.

7.2.3 Bid evaluation, selection of winning bid and bid award

There should be a public opening of the tenders on the published date. The names of all bidders and their respective subsidy offers should be announced at the tender opening ceremony. Attendance can be open for all interested parties or bidders only.

Sometimes, a quick preliminary bid compliance check is conducted during the public bid opening, in order to verify that the contents of the bid envelope are complete, have been signed by the proper authority (e.g., power of attorney included), the bid bond is valid, etc. If this is not feasible during the ceremony, it is usually conducted shortly thereafter as a preliminary examination process, prior to the detailed examination i.e., evaluation.

The tender can use a single envelope format or separate envelope format for each of the components i.e., the technical proposal and the financial proposal. Best practice is to split the evaluation into two stages, as follows:

1. Pre-qualification of the technical proposal, which includes information on how the bidder meets the corporate, financial and operational requirements as well as how the bidder meets the service and quality requirements, among others; and
2. The financial proposal which is the required subsidy amount.

Only those bidders who meet the stipulated technical pre-qualification thresholds will have their subsidy request considered by the regulator.

Tender evaluation criteria should be described clearly in the tender documents to be purchased by interested prospective bidders. Furthermore, the documents should be based, to the greatest extent possible, on objective factors to avoid favouritism or subjectivity in the evaluation process. Also, the tender documents should contain a clear schedule including the duration of the evaluation period and the date on which results are announced. Depending on the complexity of the bid and required internal approval processes (e.g., by the board of the regulator), the evaluation period typically varies between four to six weeks.

Technical proposal evaluation

The evaluation team should be drawn from within the regulator and ideally should include various subject experts e.g., an engineer, a lawyer, a financial expert or accountant, an economist, somebody with a business background and possibly a procurement specialist. Sometimes consultants or other outside experts (e.g. an academic) are part of the evaluation team to add international expertise and provide an added independent view.

The team should be led by a senior figure of the Universal Access and Service Fund (UASF) or regulator. Ideally, each member of the evaluation team will review each technical proposal separately and independently and come up with an assessment as to the suitability of the bidder. These evaluations are then compared and discussed in a group meeting, any uncertainties or questions in regards to the compliance of a bidder removed, and a conclusion reached whether the technical proposal is compliant or not.

The evaluation can be carried out with a simple compliance checklist covering a number of criteria and coded or coloured as follows:

- Compliant (green colour);
- Clarification required (yellow colour); and
- Non-compliant (red colour)

Evaluation criteria are the same criteria that are spelled out in the bidding documents, which need to be met to satisfy the technical requirements. The compliance checklist of the bidding documents should cover all the necessary criteria, and can be used by the bidders to check if they have covered the criteria as well as the evaluation team. The regulator typically reserves the right to reject bids that do not conform to all minimum requirements.

To summarise the process, bidders' proposals should be announced as acceptable or unacceptable based on the criteria set out in the bidding documents. These criteria include but are not limited to the following:

- Does the bidder meet the minimum corporate qualifications such as a minimum net-worth, financing capacity, proper incorporation and

- operational experience;
- Has the minimal service level target been offered;
- Has the required quality of service level been guaranteed;
- Are the proposed tariffs within the allowed limit set by the regulator;
- Is the technical solution allowable in accordance with current law and regulation; and
- Is the technical solution field-proven, deployed in at least two reference projects (in the country or worldwide), and providing the service required in the bidding documents?

Within a stipulated period after tender closing (e.g., maximum of one month) the universal access and service (UAS) department director and his evaluation team should determine which bidders have met the minimum service obligation requirements and the minimum corporate, financial, technical, operational and quality standards.

Financial evaluation

The second stage relates to the least amount of subsidy required by the bidders. All qualifying bidders who have met the publicised qualification criteria will be evaluated in the second stage only with regard to the amount of funding they require. The lowest bid for a subsidy wins.

Bidders who do not meet the minimum standard in all the required criteria in their technical proposal will not have their financial offers considered.

Bid award

Once the evaluation team has determined the winning bid, a letter of intent is sent to the winning bidder, notifying them of the award and requesting acknowledgement and willingness to enter into contract negotiation.

After the winning bidder acknowledges the award, the evaluation results can be made public to all participating bidders. Bidders that did not qualify have the opportunity to obtain information on why they did not qualify and may lodge a complaint if they are not satisfied with the reasons given to them.

With a pre-published draft contract and firm universal access and service (UAS) requirements, room for actual contract negotiations is rather limited. The competitive tender would be unfair if the winning bidder can change UAS requirements. Also, as the draft contract is an appendix to the bidding documents, bidders have had the opportunity to comment or question any particular provisions of the draft contract beforehand. The only changes in the contract might refer to minor issues such as a modified implementation and payment schedule (as long as the overall completion date does not change) and modifications in monitoring, reporting or technical auditor processes and communication protocols.

Once the contract is signed, the bid bond is returned to the winning bidder as well as to all other bidders. Typically, at the time of contract signing or shortly thereafter (but before the bid bonds are returned to the bidders), the winning bidder has to furnish the performance bond, as per the bidding documents.

7.2.4 Business or sustainability plans as pre-requisite for fund allocation

Business plans are important to any ICT venture. Donors or Universal Access and Service Funds (UASF) should request a business plan before they support larger pilot projects. This business plan ideally meets certain minimum criteria and demonstrates sustainability of the project concept, as well as its development impact or outputs. This is particularly important when the allocation of funds does not involve a competitive tender.

A business plan (or sustainability plan) for a pilot project should always describe the project's rationale, demand basis, costs, expected revenues and financial performance, which need to be met to qualify. The following is an illustrative list of business plan elements which a donor or UASF may require, as appropriate to the particular project:

- The project purpose and mission statement – a brief introduction to the project idea, the need or opportunity and how the project addresses the opportunity.
- Sponsorship & ownership - a clear outline of the ownership structure and participants in the project, and whether the project will be a franchised or independent business, a community co-operative, an arm of local government, etc.
- Market and beneficiary assessment - a demand assessment (based on demographics, interests, economics, needs and affordability). The assessment should include a market description that assesses the role of the project compared to the availability of other competitive services (e.g., for a public access project, identify other phone shops or Internet cafes), and the specific needs of the region, including the kind of information or services needed by the local community. Explain how they will benefit and how they will justify paying for the services. This should include an estimate of the expected usage (e.g., number of calls, Internet minutes of use, messages, pages printed, photocopies, forms delivered, or whatever mode of information and service is to be offered).

- Legal and regulatory framework, licences and authorizations – a summary of the status of the project proposal with respect to licenses and authorizations. Does the project, or the site owner(s) require a license or special authorization to proceed and have these been granted. If special authorization is required, describe the steps taken and the likely outcome, the conditions attached or the outstanding issues to be resolved.
- Marketing and sales plan – an explanation of how the market potential will be realized, people sensitized and made aware of the service(s) and, if appropriate, drawn to the site(s).
- Competition – an assessment of how the market and sales assumptions could be affected by other similar installations, networks or alternatives, and the impacts on the project target.
- Technical assessment - an assessment of the area's access to communications infrastructure, the topography, the access technology and other systems (e.g., power) required. This assessment should recommend the most suitable technology for the characteristics of the site(s), and the initial and ongoing costs to connect and maintain the facility or facilities.
- Financial worksheet - this should contain start-up expenses and start-up costs, as well as projections of number of users, traffic usage, prices and revenues, expenses, financing costs, operational costs and salaries, etc. Financial schedules, showing breakdown of costs and revenues for each major item, unit, department or service (e.g., telephone, fax, computer, Internet & email, training, photocopying, etc.) should be included. Amortization of costs, depreciation and replacement strategy should be shown.
- Financial bottom line analysis - this must show the profitability calculation or any variations from profitability explained, justified and projected into the future to show how the situation will improve.
- Funding requirements – a summary of funding requirements and of financial contributions, including in-kind contributions, from all sources. The scale of the investment and the scope of services proposed must be justified.
- Operational plan – an organizational chart with clear responsibilities, staffing plan, equipment and facility plans and assessment of possible problems and solutions.
- Training, capacity building and any other human resource development – the needs of the project and the assigned effort, plan, costs and partnership(s) to meet all stated goals for staff or users.
- Community inputs - if appropriate, an assessment of support from the local community to confirm that the requirements are understood by the community and the sponsor(s).
- Partnerships – after assessing all of the market, technical, operational, financial and human resource development needs and challenges, clearly outline the nature of partnerships required and secured for successful project implementation. Examples could include a selection of the following: a business with local operating experience; local merchants; telecom operator; Internet service provider; NGO and community organization specialising in training; university; international or national donors, government, etc.
- Risk and sensitivity analysis – how is the project's performance and success affected by various market, sales, cost, pricing or operational scenarios, especially the worst cases.

In addition to the above, other requirements dealing with the impact of the project and the project's development outputs also need to be considered. A practical guide of how to approach these requirements in an application for funding can be found in the table below:

Table: Development rationale	
Vision and objective	- What is the project's core idea, specific objectives and key outputs? - Describe the before/after picture (e.g., 250 villages which previously had no access to telephone services will now have public phone shops and available private services; 25 institutions serving rural communities and addressing specific social issues will have high speed access to the Internet through five new regional Internet POPs.)
General development focus	- Is the project consistent with development goals that have been identified by policymakers or other development participants in the country or countries where the project will take place? - Does the project have the potential to influence larger development agendas within the telecom or ICT sector (e.g., market liberalization) or further afield (e.g., break new ground in education or health)? - Will the execution and success of the project promote sustainable and equitable development?
Project beneficiaries	- Is the project targeted on any specific communities, classes of people, income groups, age groups, gender? - How will the project address the needs and demands of its target groups?
Nature of the benefits	- What is the value of and how useful are the services provided? These should be explained in detail with targeted outcomes described. - What is the primary nature of the benefits of the project? e.g., access to voice communications, business information, health information, education, government services. - Will the project have any impact on employment, working conditions or quality of life? - What secondary impacts will the project have? e.g. better delivery of social infrastructure services (education, government, business & finance, health & welfare)? - How will the project affect culture, values, freedom, democracy, etc.?
Distribution of benefits	- What specific benefits or opportunities will various income classes, especially the poor, derive from the project? - Will the project help to empower the poor, vulnerable or disadvantaged groups and contribute to poverty reduction, and how? - What will be the degree and nature of local participation in the project design, implementation and ownership?
Gender & accessibility considerations	- Does the design and methodology of the project take into account different gender roles, perspectives, interests, and priorities? - Is the project's potential impact assessed from a perspective that recognises gender inequalities and imbalances? - Will research data, demand and expected impacts be broken down by gender? - Do the project's capacity-building features reflect gender considerations? - What is the specific value of the services to women, e.g., in facilitating better access to information, assistance, credit and business opportunities? These should be cited as specifically as possible - Are services accessible to people with disabilities and are their special concerns considered in the project design?

Source: A rural ICT toolkit for Africa, Andrew Dymond, Sonja Oestmann, infoDev 2003

For smaller ICT projects such as small or micro-entrepreneurs applying for grants to open a telecentre or phone shop, the above requirements are obviously too onerous and complex. See [Section 7.1.4](#) and its Practice Note Uganda's application process for rural schools to have Internet access for guidance on simpler qualification requirements.

7.3 Inspection, payment, monitoring and evaluation

Successful universal access and service (UAS) programmes need the following:

- The supervision of the implementation of individual UAS projects and the inspection of milestone achievements by a technical auditor for payment release, as discussed in [Section 7.3.1](#);
- The monitoring of UAS projects which is helped by reporting requirements by the UAS service provider in order to have an early warning system of problems and sufficient data on which to evaluate projects later, elaborated in [Section 7.3.2](#); and
- The evaluation of individual project performance in terms of their impact as well as a strategic review and evaluation of the UAS programme and Universal Access and Service Fund (UASF) performance outlined in [Section 7.3.3](#).

7.3.1 Inspection, payment and technical auditor

The main two purposes of a technical auditor are to inspect and certify that specific milestones set out in the payment schedule for the universal access and service UAS service provider are met (or have not been met), and, in the case of a force majeure event (e.g., weather damage such as lightning, storms, earthquakes; industrial disturbances such as strikes, or civil disturbances such as war, terrorist actions, and epidemics), certify that a force majeure event has occurred and make proposals for an amendment of the UAS project implementation and service provision in light of the force majeure event. The inspection and certification process of the achievement of milestones is very important as it plays a role as a notary, certifying the provision of the required service and hence allowing the UASF administrator to legally release the funds.

In general, the technical auditor position should be contracted outside of the regulator, using a competitive process, based on detailed terms of references and expertise requirements which are in agreement with the bidding documents and the contract signed with the UAS service provider. In smaller projects, staff from the regulator might be able to perform the milestone inspection and certification, to save time and resources. However, this could be based on the premises that if a dispute or force majeure event occurs, an outside and independent technical auditor is contracted to solve the issue.

Timeliness of milestone inspection and milestone certification is of the utmost importance to secure timely payment and a smooth roll-out of any UAS project.

7.3.2 Monitoring and reporting requirements

To assist with the monitoring of universal access and service (UAS) projects, reporting obligations of the UAS service provider are typically already outlined in the bidding document and are carefully specified in the actual contract. These requirements relate to the project implementation schedule, which is often related to a network being rolled out and becoming operational, and then to the quality of service requirements. The two tables below give an example of typical reporting requirements.

Network status and roll-out

The department in charge of UAS within the regulator should require regular reports from operators that show network and service status and roll-out statistics. This provides a record of total network achievement as well as monitors the operator's performance against their service contracts.

These reports might be monthly or quarterly, as appropriate. Typically the frequency decreases after the implementation is complete. Categories for reporting will typically be, as a minimum, those shown in the table below.

Table: Network or project implementation status report	
Indicator	Measure
Total existing customers	E.g., Private phones; business/institutional, residential and public access phones Internet customers (corporate, business, residential, classified by service and speed)
Network extent & coverage, total and district-by-district (or other appropriate administrative unit)	District population within coverage of service No. of public access phones, Internet POPs or public Internet centres built and in service Broadband facilities
Percent completion	Percent of total network obligation in service Percent of localities with total UAS service requirements completed
Current status of obligation achievement	Work remaining to complete next milestone Expected date to reach milestone

Source: ITU-infoDev ICT Regulation Toolkit – UAS Module

Service quality

The department in charge of UAS should maintain a database of service quality requirements and operator compliance, in order to:

- Ensure that subsidised operators provide an acceptable grade of service in accordance to their UAS service agreement;
- Determine the need for remedial action; and
- Create competitive pressure towards good performance.

Typical minimum quality related issues to be monitored and recorded are listed in the table below:

Table: Service Quality monitoring	
Indicator	Typical indicators or required activities
Required quality standards	To be made publicly available on websites, etc.
Complaints	The regulator typically has a public (toll free) number to call for customers or service retailers and to lodge a complaint regarding the service of the operator in their area and a subsequent complaint and resolution process. Data on each operator, including a UAS service provider, should be kept separately, and can be recorded in a database or spreadsheet format to facilitate both quantitative and qualitative analysis and response.
Faults and repairs	Operators and service providers will be required to organize and publicize their own retailer and customer toll free service centre numbers, and establish an operational support & customer care system that can facilitate good response, and to report to the UASF fault statistics, fault diagnosis and time to repair.
Traffic or usage	For telephony - incoming and outgoing traffic should be reported, as well as major categories of calls (e.g., international, national, fixed-to-mobile, mobile-to-mobile, etc.) For Internet – usage data, number of users and/or subscribers, bandwidth (available and used), major traffic destinations
Quality of service statistics	For telephony - service availability, call completion rates, congestion level, etc For Internet –service availability, peak and average down- and upstream rates
Billing and public phone manager support	Operators must be able to deliver, to their public telephone retailers, complete summaries of per-call outgoing and incoming call times, and monthly summaries, showing calls, average call time, total call time, outgoing and incoming financial amounts owing, and account balance
Public Internet centre statistics	Actual opening hours, availability of PCs, number of users per month (incl number of female users and disabled), data on service usage (i.e., for several services on offer), availability of training and technical support, etc.

Source: ITU-infoDev ICT Regulation Toolkit – UAS Module

Enforcement, recourse & penalties

When appropriate, UAS department project officers should:

- Conduct random and routine checks of field performance to verify operating statistics and fulfillment of contractual obligations; and
- Prepare consolidated monthly internal reports to summarise project progress, achievements, explanations and reasons for variance from norm, and recommended further action.

The indicators listed in the tables above, as well as other criteria included in the UAS service contract, should be used as a basis for the UAS department to monitor progress and to enforce the minimum stipulated quality standards on operators and service providers receiving subsidies in the UASF sponsored programme.

Once successful bidders for UAS projects have commenced operation, they should be subject to regular audit. Failure to meet minimum acceptable standards, as spelled out in their UAS service contract, should lead to notification that the provider should improve their level of service within a stipulated period of time or to meet contractual obligations. Failure to do so should carry the jeopardy of financial penalties, as provided for in the UAS service contract, and should include the reclaiming of subsidies already paid out.

7.3.3 Strategic reviews & evaluation studies

Individual ICT projects as well as national universal access and service (UAS) programmes benefit greatly from periodic reviews and evaluations, and also help to increase public knowledge about experiences, impacts and pitfalls.

Evaluation of the UAS programme

National UAS programmes are ideally subject to a strategic policy and management review in regular intervals, for example every three years. The same applies for Universal Access and Service Funds (UASF) in the cases where a country chose to use a UASF to fund,

manage and implement its UAS policy and programme. The review is typically commissioned by the relevant ministry on behalf of the government and is ideally carried out by an independent entity (with relevant expertise in the fields of universal access and service, project finance, and operational management).

Without limiting the terms of reference of the review, which should be prepared by, or on behalf of, the government, the evaluation should consider:

- The achievements of the UAS programme and, if applicable, of the UASF against its objectives;
- The impact and contribution of the UAS projects and services on the development of the country and the reform, liberalization and development of the telecommunications sector;
- The role of the commercial sector and of development or financing partners in contributing to the UAS programme implementation;
- If applicable, the collections and disbursements of the UASF against projections and the costs and effectiveness of the UASF's management and management structure;
- The strategic options for future development of the UAS programme to further meet its objectives;
- The financial requirements to meet these objectives, and recommendations with respect to future levies if applicable, fund raising and partnerships; and
- Other strategic recommendations regarding the direction of the UAS programme and management of the Fund, if applicable.

The government can use the results of the study and its recommendations to guide future UAS policy, renewal and revision of its objectives or, where applicable, the mandate of the UASF for a further three to five year period.

Evaluation of ICT projects

There is a great variety of what exactly is evaluated in an ICT project, with which evaluation methods and by whom the evaluation is done, in addition to the variety of ICT projects itself. The following illustrates various approaches to ICT project evaluation, without attempting to be comprehensive.

Evaluation focus:

- Impact on poverty reduction;
- Improved government services provision;
- Impact on education;
- Impact on macro-economic situation;
- Social diffusion and use of ICT services;
- Financial sustainability;
- Social development impact;
- Stakeholder impact e.g., on organizations that manage or own the project; and
- Impact on entrepreneurship and innovation.

Evaluation methods:

- User and usage analysis (e.g., user demographics and how services are used, for what purpose, frequency, etc.);
- Beneficiaries or stakeholder interviews and analysis;
- Observation; and
- Measuring changes in income or job creation.

Evaluators:

- Academia;
- Project sponsors;
- International development agencies;
- Social investors;
- NGOs;
- Commercial associations; and
- Private consultants.

It is helpful to already develop an evaluation approach at the ICT project planning stage, which is tailored to the project objective, has a practical evaluation method and uses defined indicators and measurements to assess the particular project impact. It might be required to conduct a baseline study before the project is implemented in which certain key indicators are measured in order to assess the changes after project implementation. It is also advisable to choose in advance the time of evaluation i.e. to make a determination of how long it will take for impacts to take effect. The listed reference documents provide further insight on evaluation approaches and success of evaluations.

8 Technologies for Universal Access and Service

CHAPTER 8 TRANSLATIONS

 [Version française \(PDF\)](#)

 [Versión Española \(PDF\)](#)

Developments in technology affect the cost, acceptability and feasibility of services and have a direct impact on universal access and service (UAS). Because technological developments influence regulators' expectations and users' technology preferences, minimum requirements for and expectations of UAS increase over time.

UAS policy needs to be resilient and forward looking as it takes emerging technologies into account, but it should aim to be technologically neutral. Regulators should be informed observers regarding technologies, but they need to allow UAS providers to choose which technologies are cost effective.

As an overall principle, it is important to note that technologies are neither isolated from market, nor solely the determining factor in successful service provision. Country by country, whether a particular technology is an appropriate solution for UAS and rural areas, and for low income people, depends strongly on these market factors:

- Competition (the market position of the providers, their service packages and pricing strategy);
- Demand and affordability;
- Customer density; and
- End user terminal distribution and availability.

Such factors should not be overridden by governmental preferences; technological choice should be left to service providers and the regulator should focus on providing equal opportunity for participants.

This Chapter provides an overview of relevant trends and issues for UAS. [Module 7 - New Technologies and impacts on Regulation](#) provides a more comprehensive coverage of trends, with references where applicable. Module 7 describes in detail the four main streams of technology development - Internet and Internet Protocol (IP), Mobile Communications, Next Generation Network (NGN) infrastructures, and Convergence.

These trends create a new ICT network paradigm for the Information Society and imply that there is a need for UAS policy interventions to encourage network and service build-out in directions that are regionally balanced and ubiquitous. However, just as the mobile revolution has driven progress in achieving UAS for telephony, it would be advisable for regulators to give high regard to fundamental market developments taking place in the broadband field also.

In summary, policy makers and regulators need to recognize the following:

- The requirement for UAS has moved from pure telephony to include broadband [\[1\]](#) (thereby allowing access to different types of content and ICT applications);
- The trends in Internet and IP development, NGNs and Convergence are giving impetus to the emergence of a "broadband revolution." Commercial and market forces in this development promise to be just as dynamic as those which drove the mobile revolution;
- UAS policy needs to harness the principles of competitive market regulation and technological openness/neutrality to encourage the most economic and sustainable deployment from among the plethora of technologies available for ICT.

END NOTES

1. As a basic definition, broadband refers to an array of digital, packet-switched network technologies that allow the transport of digital bits at high speeds. These technologies are both wireless and wire-line, and they include both upgrades to existing networks (for example, xDSL or 2.5G networks) and entirely new infrastructure (such as all-fibre networks, WLANs and 3G systems). In 2008, broadband is defined as always on Internet access with a speed equal or greater than 256 kbps by the OECD.

8.1 Technology and service neutrality

Historically, services were often regulated according to the different types of technologies; for example, wireless fixed telephony has had different licence obligations from wire line fixed telephony.

Resources like phone numbers, radio frequencies and rights of way have often been regulated in ways that restrict the services using them; for instance, certain radio frequencies are historically reserved for fixed wireless (e.g., CDMA) or mobile (e.g., GSM) telephony.

Regulators now aim for technology neutrality within service definitions, as explained in [Module 6 Section 4.3.1](#) and outlined in the Practice Note *Service neutrality in the allocation of scarce resources*. Neutrality helps service providers react quickly to technological changes, whereas tying phone numbers, radio frequencies, operating licences or universal service/access obligations to the use of particular technologies (such as PSTN, GSM or CDMA) could impede progress.

In the field of Universal Access and Service Funds (UASFs), subsidies have traditionally been allocated in service-specific ways (e.g., for fixed telephony payphone services). This has been changing recently, with more and more countries allowing service-neutral competition (e.g., fixed or mobile) as well as technology-neutral competition (e.g., between GSM, CDMA, WiFi, WiMAX and VSAT) for UASFs.

Universal access and service (UAS) policies and funding strategies that are technology-neutral should be based on service targets and quality of service (QoS) standards, within which UAS providers are free to choose the most cost effective technologies. The targets and standards should reflect user demand and preferences, preferably based on results of a consumer/user survey, as described in Section 5.3 of this module. ICT Quality of Service Regulation: Practices and Proposals discusses how these standards should be selected and defined. Regulators might need quality of service standards for UAS that differ slightly from those for the national service (as well as from those for UAS in other countries), depending on cost, feasibility and how uniform the service is intended to be across the country.

In practice, technology neutrality has limits and issues that need to be taken into consideration. Different technologies may offer similar services, but customer demand and quality standards, and required service growth, need to be well defined at the outset. Without clear specifications, less than optimal results can arise. These might include:

- **National service compatibility** – Internationally, open competition is best practice for UAS tendering. However, even though the most economic choice is made, competition for telephony to rural areas between fixed and mobile, established and new entrant providers, each with alternative technologies, could give a sub-optimal outcome for customers. For example, service from a dominant mobile operator with a national network might offer the preferred outcome for users who want to use their handset and service wherever they travel in the country, but if the UAS tender was won by a new entrant with an alternative technology and little national presence, and with uncertain (though competitively determined) future build-out, customers may end up with inferior service.
- **Service quality and scope** – UAS competitions that allow satellite VSAT operators to compete with mobile operators for public access services are limiting the potential for market expansion as well as access to affordable private service for customers. If mandatory private service provision is also included as a required scope of service, VSAT operators will not be able to comply and thus be discouraged from bidding. Such a requirement (as included by the Ugandan regulator in its Rural Communications Development Fund (RCDF) universal access tenders) may effectively limit competition to mobile or fixed wireless services, but is more effective at using funds to help promote market growth and service sustainability in rural areas and thus foster universal service.
- **Data speeds can dictate technology choice** – Broadband service with as high a bandwidth as feasible is the ultimate target for UAS to the Internet in rural districts. The market currently offers a wide range of possible access network technologies (e.g., EDGE, WCDMA, CDMA2000 1xEV-DO, CDMA2000 1xEV-DO, HSPA, WiFi and WiMAX) [1]. Some are currently only available in urban areas and are unlikely to migrate out to rural areas until the demand is perceived to be significant. Universal Access and Service Fund (UASF) strategists could dictate the highest speed available, though in doing so they may actually be limiting the number of bidders as well as long term service sustainability. Setting the requirement to meet standards commonly available today from the network operators most capable of providing commercially sustainable service could be the most practical strategy for ultimate growth of the broadband market. Very often, the most practical bandwidths will have a huge impact in terms of service and application availability in any case. Once advanced services are established through the initial competition, bandwidths will subsequently increase further, in stepped fashion, as the technology trends and market sustainability dictate.
- **Backbone selection** – Some governments want network build-out into rural areas using fibre backbones and are considering the subsidization of investments from UASFs or government sources. On the other hand, as noted in [Section 8.2.3](#), terrestrial radio may have sufficient capacity for all realistic levels of broadband demand into many areas, as well as offer economic synergies for operators wishing to expand mobile coverage. Generally, the market should decide on backbone selection, but in some cases mandating the use of a particular technology (e.g., fibre) might be justified. The decision as to whether this is economically and strategically justified should be based on a feasibility study, as well as on industry consultation. Chile has used UASF funds to finance fibre infrastructure [2] and India's USOF is also expected to offer subsidies for fibre build-out. In the meantime, the USOF is also funding passive terrestrial infrastructure (towers) in remote rural areas, which will doubtless be linked together mostly by microwave systems (see [Section 3.4.6](#)).

Regulators should maintain technological neutrality as much as possible; market players should determine the viability of technology choices. It is not necessarily possible for UASFs to influence technological choice if the long term business case dictates otherwise and is not able to demonstrate sufficient demand. Newer technology is only better than older if it improves UAS goals. This point is stressed in Information and Communication Technologies, Poverty and Development: Learning from Experience.

END NOTES

1. These are not the only abbreviations. CDMA is particularly confusing: "2000" in "CDMA2000" refers to a particular year, but "450" in

“CDMA450” refers to a particular frequency (so something might be both CDMA2000 and CDMA450), while “1xRTT” and 1xEVDO” are sometimes shortened to “1x” and “EVDO” respectively. Strictly speaking, “CDMA” signifies certain network access methods that are to be contrasted with FDMA and TDMA; the particular methods used in standards that are widely referred to as “CDMA” have brand names such as “cdmaone” and “CDMA2000”.

2. In 2007, Chile's telecoms regulator Subtel used the country's Telecommunications Development Fund (TDF) to subsidize the implementation of two fibre-optic transmission networks in southern regions of the country which lacked any mobile coverage or Internet service.

8.2 Technology choices

The main network technologies, and their economic characteristics, are described in [Module 7 Section 2.2.2](#) on networks innovations, are:

- [Copper based access networks](#)
- [Cable TV](#)
- [Optical fibre](#)
- [Power line communications](#)
- [Mobile Networks](#)
- [Wireless networks \(other than mobile\)](#)
- [Satellite](#)
- [Key point and recommendations](#)

This section describes the network technologies that are most suitable for underserved and rural areas, following the same typology as in [Module 7 section 2.2.2](#). Some of these technologies are appropriate for last mile telephony or Internet access, while others might be suitable for backhaul from rural and remote areas.

8.2.1 Optical fibre

Optical fibre, with its unsurpassed capacity, is particularly suitable for backbone networks and plays a key role in migration to broadband services. Optical fibre is also used for access networks to major business customers in city or town centres, and increasingly in developed countries, for residential access, with the fibre reaching to:

- Street cabinets (Fibre to the Cabinet – FTTC);
- Curb / Kerb (FTTC / FTTK);
- Buildings (FTTB – largely businesses and residential apartment blocks); and
- Home (FTTH).

The cost of fibre is becoming competitive with copper wire, but installation is expensive. The considerable costs of labour for fibre installation makes it as expensive as copper in the local loop. Fibre may therefore not be economically justifiable over existing copper plant except for advanced broadband applications in new greenfield situations, or as replacement for obsolete cable at the end of its useful life.

Fibre is appropriate for trunk and long distance inter-city transmission. It is favoured over terrestrial radio (microwave) transmission systems when the usage level is high enough to justify fibre's higher capital and operating costs.

Some countries are considering the deployment of fibre backbone transmission systems under UASF funding. The Indian USOF is considering the subsidization of fibre networks into rural areas that are likely to have the greatest demand for broadband Internet service provision. In 2007, Chile's Telecommunications Development Fund (TDF) subsidized the implementation of two fibre-optic transmission networks in southern regions of the country, that lacked mobile coverage or Internet service. The first project, the Fibra Óptica Austral Project, extended the national network to 31 localities in Chile's Tenth and Eleventh Regions (Los Lagos and Aisén). The network cost 4.6 million USD in private and government investment with a subsidy of 2.5 million USD. The second project involved network extensions from the Eleventh Region into the Twelfth Region (Magallanes), which is the most southerly.

Fibre is particularly important in Next Generation Networks (NGNs), which are inherently broadband. They are discussed in [Section 8.4.1](#).

8.2.2 Wireline networks

Copper access networks

Copper has no application beyond local access. In the context of developing countries, copper is increasingly used solely for urban applications. Copper access, extensive in developed countries, has significantly contributed to universal service. Several countries where network penetration is high have designated incumbent network operators as their universal service providers; this has happened in much of the EU, and is described in [Section 3.1.2](#). Some other countries, such as South Africa, have included such obligations in the licences of incumbent network operators. However, this practice is declining as market liberalization proceeds and customers are demonstrating that their preferences do not necessarily involve copper-based service.

In many developing countries where fixed networks are no longer expanding, wireless technologies are likely to be preferred. Although copper access can achieve high data rates, wireless alternatives are increasingly able to compete.

Coaxial cable

The high capacity of coaxial cable has led it to be used for television transmission in many countries. In India, the density of cable television connections is very high, and there are many local cable operators in cities and towns who use coaxial cable. In principle, these cable networks could be used for distribution of broadband Internet and telephony together with television channels (Triple Play). In practice, many are inhibited from doing so by the nature of the network architecture (tree and branch) and the cost of upgrade. In cities and towns, most modern cable TV companies now use fibre at least to street cabinet level, and have architectures that allow easier migration to telecommunications service provision. While this can play a role in progress towards urban and semi-rural universal service, its potential role in providing universal access to less developed areas is generally very limited.

8.2.3 Terrestrial Radio

Terrestrial radio systems – ranging from VHF and UHF frequencies below 1 GHz to microwave systems up to 30 GHz – are central to universal access and service (UAS), supporting long distance backhaul, local point-to-point and point-to-multipoint connections and last mile access. Technologies such as GSM, CDMA, WiFi and WiMAX that play the largest role in the provision of universal access and service (UAS) to telecommunications and ICTs are discussed in [Sections 8.2.4](#) and [8.2.5](#).

Point-to-point microwave links, typically with hop distances between repeater terminals ranging from 10 Km up to 30 Km or more (depending on frequency, topographic and atmospheric conditions, as well as required service reliability) can adequately supply backbone services for both PSTN and mobile telephony or IP enabled links for hundreds of kilometres. Bandwidth or communications channel capacity may range from less than four E1's (8 Mbps or 120 voice channels) to STM1 (155 Mbps or 63 distinct E1's) and STM4 (622 Mbps or 252 distinct E1's). Currently, there are fewer microwave systems providing the sole means of backbone at the higher level of capacity as fibre is becoming favoured for high capacity routes. The bandwidth of fibre systems is virtually unlimited for many practical purposes.

Microwave has the advantage of having repeater towers that can be shared by mobile or WiMAX base stations along major transmission routes. These routes often overlap with transportation routes that provide revenues for the mobile companies. However, the cost of operation and maintenance, including power supply and fuel to remote sites lacking commercial power supply, can be prohibitive in developing countries. This contributes to the economic justification for fibre systems on the heavier capacity routes, and often even on relatively light routes.

8.2.4 Mobile networks

Mobile networks, together with fixed and other non-mobile wireless access networks (see [Section 8.2.5](#)), have become favoured for universal access and service (UAS) applications for the following reasons:

- Mobile networks are generally less expensive and quicker to deploy than conventional wireline solutions (lower civil engineering costs), and are readily deployed and maintained over many terrains;
- Mobile second generation (2G) experience has demonstrated that service can spread rapidly due to high user demand and also contributes to economic development;
- Mobile networks can resist damage and theft better than wireline networks;
- Mobile networks are more able to provide both public and private access, and share capacity between many users in an area;
- Both mobile and non-mobile networks can easily exploit resources (i.e., radio frequencies) that are often underused in rural and remote areas; and
- Considerable development effort is going into reducing costs, which will enable mobile operators to expand economically into sparsely populated rural areas.

Mobile operators have an increasingly recognized role in providing UAS and are being allowed to participate in UAS funding competitions.

The role of 2G services – both GSM and CDMA - in voice telephony is clear and has been well documented. The role of 2G/2.5G and 3G will be less clear in the provision of universal access to Internet services, since more choices are emerging from WiFi and WiMAX

networks in particular. The choice depends on the economy of scale most appropriate to the situation.

This section provides information on the following mobile technologies and adaptive measures that relate to UAS:

- 2G and 2.5G Networks
- 3G Networks
- CDMA450 Networks
- Cost reduction trends for rural areas

2G and 2.5G Networks

2G and 2.5G based services are well suited to national UAS deployments, since the cost is mitigated by the pre-existence or deployment of a main network. Thus the required investments are for incremental extension only.

Most mobile networks support text messages, typically through the Short Message Service (SMS), as well as voice calls. Many applications have been designed to use text messages; for example, to contact people who do not read well, the senders of messages can create voice messages and simply send short text messages to alert the recipients of the voice messages, as used in Bangladesh. There are also systems that convert between SMS messages and voice messages (and systems that convert between SMS messages and email), for transmission to users on other networks. Such systems could do much to improve the accessibility of communications to people who have impaired hearing, speech or vision, as illustrated in the Practice Note *Communication possibilities for people with impairments in the UK*.

GSM also offers the Unstructured Supplementary Service Data (USSD), which differs from SMS by using immediate communications (instead of store-and-forward communications rather like email) and having its special own addressing (instead of conventional phone numbering); because of the differences from SMS, USSD is sometimes preferred for banking applications. SMS and USSD are often regarded as data services (at least in the accounts of mobile network operators), though they do not use IP.

In some countries, text messages are as popular as voice calls, if not more so. Network operators in the Philippines, offer schemes for prepayments that are small enough to pay for several messages but which are not enough for a single call. This has created revenues for text messages equal to those of voice calls, and is examined in What works: Smart Communications – expanding networks, expanding profits. Text messages are also important in the development of financial services for the poor, as discussed in [Section 1.6.4](#). Universal access obligations might mandate that text messages be supported and that local public phone operators offer them.

In developing countries, data and multimedia services using 2G technologies are less widely provided though there might be a business case for wider use, as explained for GPRS in Internet for Everyone in African GSM Networks. It is important however, to take into consideration that the pace of later developments such as EDGE (Enhanced Data rate for GSM evolution) will soon leave GPRS well behind. Purely 2G data technologies such as GPRS can only offer transmission rates comparable with those of dial-up access, suitable for many text applications, email, financial transactions, and some audio applications such as music downloading and voice mail; their data rates are typically not high enough for good quality VoIP or web browsing. Also, price of data services on mobile can make VoIP and other applications expensive, especially for low-volume users. Mobile network operators often prefer applications that increase voice revenues above what normal VoIP does; possibilities include voice mail and push-to-talk [1].

Internet access technologies can now readily be offered by UAS providers that are mobile network operators and in many countries they are becoming available. 2G technologies such as EDGE and CDMA2000 1xRTT (which are sometimes called “2.5G” or even “2.75G” technologies) offer higher speed Internet access and are derived from the widespread 2G technologies. They are often simple enhancements of existing 2G networks for telephony which already require much of the same network infrastructure. Since 2002, many new networks and phones have been able to use these technologies. They could be important for universal Internet access.

For the ITU, EDGE and CDMA2000 1xRTT formally qualify as 3G technologies under the umbrella of International Mobile Telecommunications (IMT), but they are often regarded as 2G technologies. This can raise a regulatory issue, since occasionally services based on EDGE have been prohibited on the grounds that 3G licences would be needed; this happened in Egypt [2].

3G Networks

3G technologies such as WCDMA, HSPA and CDMA2000 1xEVDO are evolutions of 2G and 2.5G technologies intended for mobile broadband Internet access. 3G networks can use many parts of 2G networks; also, WCDMA can be replaced by HSPA (in the forms of HSDPA and HSUPA) largely through software upgrades. Regulators need to consider whether universal Internet access might evolve similarly through step-by-step upgrades and geographic expansion of existing network capabilities. For broadband Internet access, multiple choices are emerging.

In developing countries, 3G networks may exist in urban areas but often do not extend to rural or remote areas where the business cases for them are not proven. 3G may require heavy investment or subsidies to extend service from urban cores to nationwide coverage, since the networks require major bandwidth enhancements to the 2G/2.5G infrastructure. However, there are signs that 3G networks can be rolled out more rapidly than 2G networks, since they can exploit the existing infrastructure and experience. Japan took eight years to achieve 100 per cent coverage with 2G mobile networks, but 3G coverage was accomplished in just four years, as noted in ITU World Information Society Report 2006.

Countries in which extensive 2G/2.5G networks are not available may find difficulties in attracting investors for greenfield 3G development, though these cases are reducing with time.

3G may participate in universal broadband and Internet access in the following ways:

- 3G network operators could contribute to UAS funding through the sales receipts for governments of radio frequencies (or possibly operating licenses) or paying levies on 3G revenues as per the standard practice in relation to Universal Access and Service Funds (UASF).
- 3G network licenses could include modest build-out obligations into less-urbanized and regional areas in exchange for lower license fees. The objective would be to test how well 3G can meet the demand for competitive service from rural based fixed and semi-fixed customers such as vanguard institutions, e.g., schools, government, NGOs and leading businesses. Many governments have included coverage requirements in the license obligations of 3G mobile operators. In Sweden, the telecom regulator reports that the country's high 3G population coverage is due to regulatory obligations, with roll-out faster than purely commercial conditions would have dictated: the regulator allowed 3G network sharing but required services to be offered to 7 million people (out of a population of 9 million) by the end of 2004, 8 million by the end of 2005 and 8.5 million by the end of 2006.
- 3G network operators could offer their IP backbone networks on fair commercial terms for other uses such as competitive ISPs and VoIP operators using the public Internet. This might be opposed by the operators on the grounds that it weakens network security, because 3G services have walled gardens (controlled network environments) that deliberately exclude the public Internet. However, some 3G network operators are coming to terms with the Internet by demolishing walled gardens and providing public Internet access with simple pricing models, just like conventional ISPs.

3G technologies can have data rates comparable with those of DSL. Besides offering major speed improvements over 2G and 2.5G technologies for applications such as file downloading and web applications, 3G technologies can support further audio applications such as VoIP and some video applications.

CDMA450 Networks

By using the lower 450 MHz frequency range, CDMA technology allows larger cell sizes, which are appropriate for rural areas. In turn, this means reductions in installation costs, as fewer base stations are required. CDMA also supports high-speed transmission of data, so the advanced 2.5G and 3G CDMA Internet capabilities can be deployed.

A number of countries have already deployed CDMA450 networks both commercially and as part of their UAS programmes. A total of forty-five countries have CDMA450 commercial networks. In addition, smaller regional operators in Russia have made use of CDMA450 [3].

However, the single largest hurdle to the development of the CDMA450 market is commercial. The low number of handset options available, their higher price and the fact that even fewer available handsets offer multi-band capability, prove to be an impediment to growth of the technology. At the same time, the development of innovative approaches to rural network design and marketing by the GSM operators limits the market for CDMA450. The International 450 Association [4] and a number of mobile operators have created an alliance to aggregate purchases in a bid to drive down costs via volumes and to nurture a market for entry-level devices.

Measures to reduce mobile network costs for rural areas

The greatest challenge operators face is the cost of network expansion and operation in low population density areas with poor electricity and transport infrastructure and challenging topography. While operators may increase revenues through deeper coverage, average marginal revenues may decrease with geographic expansion.

Operators have to identify every component of cost – capital expenditure (Capex) and operating expenditure (Opex) – and minimise the total cost of ownership (TCO) of the network through addressing each significant component. Whereas minimising Capex is important, Opex is increasingly dominant in areas of rural expansion, for at least three reasons:

- Where Capex per customer is high due to low population density, ongoing Opex is driven higher because of its direct relationship with Capex (typically a reasonably fixed percentage of Capex);
- Some Opex may be higher in rural areas because operation and maintenance requires longer journeys and higher transportation costs; and
- Some specific Opex (e.g., diesel fuel) is higher because a larger proportion of sites in expansion areas may be without commercial power supply.

Operators' cost structures include business operating and network costs. Business operating cost reductions apply across the entire operation and are typically applied in both urban and rural areas to increase or maintain financial margins in the face of competition and the transition to lower average revenue conditions.

Network costs

Network operations

- Operation & Maintenance
- Spares
- Power supply (incl. fuel)
- Transmission backhaul Opex
- Site rental
- Support & training
- Network performance efficiency technology (AMR, SAIC, etc.)

Capex / Depreciation

- BTS Equipment
- Transmission Equipment
- Other site Equipment – Power Gen
- Civil Works – Towers, Shelters, A/C
- Licences

Table: Cost reduction measures in mobile networks for rural areas

Measure	Impact	Benefit	Capex	Opex
Improved ventilation, cooling and/or heat tolerance of BTS electronics	Eliminate or reduce air conditioning requirement, with consequent lower power requirement	Reduce external electric power supply, or Eliminate or reduce requirement for diesel generator and fuel supply, or Enable more economic use of solar panels	✓ ✓	✓ ✓
Improved ventilation, cooling and/or heat tolerance of BTS electronics, as well as smaller size for outside installation	As above	As above	✓	✓
Enhanced radio transmission performance	Improved and balanced "link budget" and longer signal range for "strong" signal coverage	Fewer BTS sites, resulting in lower Capex and Opex costs	✓	✓
Enhanced network voice and data carrying technology, e.g., AMR [6])	Improved quality and capacity on existing networks and maximum growth efficiency	Fewer BTS sites, and improved revenue versus cost relationship on existing and expansion networks	✓	✓
Enhanced radio & antenna technology to achieve extended range	Larger cell size applicable to and tailored to low density areas	Fewer BTS sites in very high cost and low density areas	✓	✓
Enhanced transmission technology to achieve lower interference, e.g., SAIC [7]	Optimum signal processing performance & user capacity with lower transmitter output power	Lower power consumption for equivalent network performance		✓
Smaller BTS equipment cabinet size	More portable and easier to install, easier site acquisition	Smaller shelters, more rapid deployment	✓	
Shared antenna configuration	Base stations expanded without the need for additional antennas	Reduced tower space	✓	
Mobile "softswitch" in appropriate regional location	Enables traffic to be switched locally or within a region	Minimising the need for backhaul transmission of all traffic to a central MSU		✓
Advanced pre-paid platform architecture update	More service features, automated support, etc.	Enables wider range of segments to be supported economically		✓
Market responsive site placement	Strong local community relationships	Reduced need for security guards and more rapid deployment		✓
Common backbone and tower infrastructure	Shared sites with common infrastructure has the potential to reduce build-out costs	Reduces the cost of transmission and some BTS costs	✓	✓

Clearly, no single or set of measures is superior or appropriate in all situations but there are certain strategies and technologies that reduce the costs on all networks while others are specific to costly rural environments. Operators are guided by the market, by geographical and population density, by local requirements, and sometimes by the need to standardize system-wide on a limited number of technical solutions to minimise organization and methods operations and maintenance costs.

Governments and regulators can also play a critical role in promoting cost reduction and commercial network expansion through regulatory and fiscal / tax regimes that encourage operators to employ cost minimization and increase efficiencies.

END NOTES

1. Push-to-talk combines instant voice messages to form conversations between two or more people. The talker pushes a button on a phone before saying something to one or more other people; they hear what is said without necessarily explicitly “answering the call” and can in turn push their buttons to reply.
2. See [Reality about EDGE Problem](#) (NTRA, October 2006).
3. A full list of operational CDMA450 networks available from the [CDMA Development Group](#).
4. <http://www.450world.org/>
5. Universal Access – How mobile can deliver coverage and services to all, GSMA, October 2006
6. Adaptive Multi-Rate (AMR) codec technology is an audio data compression scheme optimizing speech and multimedia messaging services over GSM, GPRS, EDGE and W-CDMA networks. AMR supports dynamic adaptation to network conditions, using lower bit rates during network congestion or degradation while preserving audio quality.
7. Single Antenna Interference Cancellation (SAIC) is a technique used for handset and BTS signal enhancement, which reduces the overall interference and results in improved quality and capacity, reduces the required BTS transmitter power and thus reduces TCO through improved network performance and power consumption

8.2.5 Fixed and other non-Mobile Wireless Access

For Internet as well as developing VoIP services, newly emerging non-mobile networks may have niches in various situations, competing with 2G and 3G mobile. Their position could strengthen. The choice depends on the economy of scale most appropriate to the situation.

Non-mobile technologies such as WiFi and wireless mesh networks built from WiFi are more suited to local initiatives for which large and expensive centralized organisation are unnecessary. Typically, non-mobile technologies can support VoIP alternatives to 2G telephony if regulation allows and if user terminals are sufficiently inexpensive.

Four forms of non-mobile wireless that may be considered for universal access and service (UAS) are:

- Wireless local loop (WLL)
- WiFi
- WiMAX
- Wireless Mesh Networks

Wireless Local Loop (WLL)

WLL is a fixed wireless service used for telephony and broadband applications, in which copper-based local loop is replaced by a wireless connection. This is described in [Module 7 Section 2.2.2](#). When first introduced WLL had great promise, especially in developing countries, as an economic solution to reach areas beyond the reach of the copper-based network. In a few cases, such as Ghana Capital Telecom's use of WLL, these hopes have been partially realized.

Generally, WLL for telephony was eclipsed by the success of 2G Mobile networks. WLL did not achieve the same economies of scale. Furthermore, even though it was initially believed that most users in developing countries did not need mobility, the lack of ability to roam from urban to rural areas with the same handset have proven to be a serious shortcoming for WLL operators. Many of these were using CDMA technology that is capable of full mobility operation, but regulations governing fixed and mobile licensing created the restriction.

In the case of CDMA, the growth in mobile networks has been accompanied by reductions in the cost of wireless access generally. Nevertheless, other factors which have limited the success of WLL are developments in regulation such as roll-out obligations on mobile network operators and their inclusion in competitive tendering for Universal Access and Service Funds (UASFs). Together these changes have stimulated the use of mobile services even in areas where WLL would have otherwise been a natural solution.

In South Africa, mobile network operators were obliged to provide fixed public payphones. In other countries, such as Uganda and Ecuador, mobile network operators have installed public payphones without being obliged to do so, because the incremental costs are small where base stations already exist.

In contrast, India's two large CDMA network operators received subsidies from the universal service fund to provide WLL service. One network operator has provided service to 600'000 users and 40'000 villages in two years through these subsidies [1]. However, pressure grew for the CDMA networks to be cut free from their fixed status, first to limited mobility (single cell or single area) status, and then to enable them to provide mobility throughout the network.

The pressure to cut WLLs free from fixed points is one reason why unified licences, as described in [Module 6 Section 4.3.1](#), were introduced in India, as well as in Nigeria and elsewhere. Increasingly around the world WLL providers, those using CDMA at least, are likely to use these licences to make their services fully mobile, with the result that conventional WLL will continue to decline as a provider of telephony service.

WiFi

WiFi (Wireless Fidelity) is a popular name for implementations of the IEEE 802.11 standards. [Module 7 Section 4.2](#) provides a brief account of WiFi; this section considers WiFi more specifically as a technology that is relevant to UAS because it has been chosen in several projects to provide Internet points of presence in rural and remote areas.

The advantages of WiFi for developing countries include:

- High data rates (compared with many 3G technologies).
- Flexibility for small networks to develop outside of large centralised organisations.
- Use of radio frequencies that are exempt from licensing in many countries (because the ITU radio regulations intend those frequencies to be used by equipment with very limited range and indoors operation, for which interference does not need control through licensing).
- Use of cheap standard equipment that is readily available and has type approval for many countries.

WiFi, with potential data rates of 11 Mbps and 54 Mbps, was originally intended to link computers over Local Area Networks (LANs) in homes and offices. It was then used to make LANs publicly accessible at indoor and outdoor hot spots and then to make long distance point-to-point connections.

To reduce interference in licence-exempt WiFi use, power emissions are restricted so signals do not go far; WiFi in a typical home or office might have a range of 100 m. With directional antennas and higher power emissions, WiFi can have a range of 8 km. Some networks (e.g., in Indonesia and Peru) sometimes use a range of 50 km, and experimental demonstrations have reached several times that far [2]. Longer ranges make deployment more difficult and expensive. However, there is WiFi standard equipment that now offers five times the data rates and twice the ranges over the original intentions for LANs.

The use of WiFi hot spots with connections to the Internet led to the development of municipal networks offering wireless broadband public access throughout large parts of cities and towns. Two of these networks are described in the Practice Note *The municipal wireless broadband networks in Knysna and Tshwanein in South Africa*. Because municipal networks may compete with, or reduce investment in, commercial networks, they are often obliged to offer open access to all service providers. This is discussed in Study On Local Open Access Networks for Communities and Municipalities.

In Singapore, the Infocomm Development Authority of Singapore (IDA), has initiated a programme known as "Wireless@SG", in which Singaporeans have access to free wireless connectivity at speeds up to 512 kbit/s, in almost every part of the country. The programme is run by three private local operators who are investing approximately 65 million USD; IDA is defraying around 19 million USD of the total cost. The programme aims to increase the number of public WiFi hotspots in the country and by March 2008, more than 6,900 places offer the service in cafés, libraries and fast-food restaurant. Wireless@SG's basic tier is free until December 2009, but there are premium features such as higher connection speeds, that people can subscribe to for a small monthly fee [3].

WiFi enables community networks in rural and remote areas to develop without large centralised organisations, even though the administration responsible may find rapid or widespread growth difficult to manage. Two well-established examples of WiFi community networks are described in the Practice Notes *The rural wireless broadband network in Myagdi District in Nepal* and *The rural wireless broadband network in Chancay-Huaral Valley District in Peru*. An example of a guide to planning and building these types of networks is Wireless Networking in the Developing World.

When networks grow they need to be scale-able and to cover long distances and offer enough resilience without making their operations disproportionately complex. In this scenario, WiFi can be used with WiMAX or even mesh networks. It could then play a major role in providing universal Internet access through centrally organised networks, as well as through community networks.

Though WiFi is intended for licence-exempt use, some countries require licences where deployment is outdoors and there is an extended range. This was the case in Indonesia for many years where, as discussed in WiFi "Innovation" in Indonesia: Working around Hostile Market and Regulatory Conditions, the use of WiFi by Internet service providers was widespread but illegal.

There are still legal obstacles to the use of WiFi and related technologies in some countries [4]. In particular, licences may be needed for operating an Internet service provider that offers VoIP, using frequency bands that elsewhere are licence-exempt, or that deploys equipment (even after stringent type approval testing elsewhere). Obtaining such licences can be expensive and slow, especially for community networks. Often these licensing requirements are becoming obsolete and could be easily abolished.

WiMAX

WiMAX, (Worldwide Interoperability for Microwave Access) is a popular name for implementations of the IEEE 802.16 standards. [Module 7 Section 4.3](#) provides a brief account of WiMAX. This section discusses WiMAX in relation to UAS because it has been marketed widely as

a technology for providing broadband in fixed and mobile networks, especially in rural and remote areas.

For the ITU, WiMAX formally qualifies as a 3G technology under the IMT umbrella, but is usually regarded as separate from the 2G and 3G technologies widely used by mobile network operators. WiMAX is intended for fixed networks as well as mobile networks, but unlike many fixed wireless technologies, it may benefit from economies due to its standardisation. In fact, WiMAX shares many of the advantages for developing countries that are listed for WiFi.

WiMAX was originally envisaged for links from base stations to homes, offices and vehicles. Its role in providing UAS needs scrutiny because expectations about its performance have often been unrealistic. WiMAX might have data rates of up to 40 Mbps and a range of 8 km for fixed networks, and data rates of up to 15 Mbps and a range of 3 km for mobile networks, however data rates can fall to 2 Mb/s because of restrictions on the frequency bands and base station locations. With directional antennas and line-of-sight links, WiMAX can have a data rate of 2 Mbps and a range of 50 km, so it is suitable for backhaul.

Eventually, WiMAX might take over the role of WiFi as computers will have both WiFi and WiMAX interfaces. Because of its mobility and VoIP provision capabilities, WiMAX can serve as a last mile application. As the potential for economic WiMAX deployment grows, policy makers and regulators will be faced with difficult decisions about whether to allow WiMAX for last mile access. Whereas 2G and 3G technologies might be better suited to the available infrastructure and levels of demand, regulators ultimately must take a technology and service neutral approach and allow operators to decide which technology is the best competitively.

WiMAX is being licensed in many countries. However, working examples of commercial networks are few and far between to date; the most notable ones are the following in Pakistan and Spain:

- Wateen Telecom, Pakistan (www.wateen.com) has implemented a service that offers Internet speeds ranging from 128 Kbps to 2Mbps and uses the 802.16e standard. The company says it signed up over 10,000 customers in the first 20 days of service. Service launched on December, 2007 in 22 cities.
- Iberbanda, Spain (www.iberbanda.es) is a broadband communications provider that offers high speed Internet, telephony, data transmission and value added services. Iberbanda has the most significant WiMAX network in operation in Europe and covers nearly 30 per cent of Spain.

While there is a broad interest and enthusiasm for WiMAX technology and its potential, the business case for WiMAX and its ultimate success is determined, as with other technologies, through the market relevant factors. These are competition, demand, affordability of services, customer density and price points and availability of end-user terminals. Some market observers and potential operators claim that the economics do not look as promising as the technology itself. Service providers are likely to make different choices in different countries, appropriate to local market conditions and potential. WiMAX faces fierce competition from 3G technologies and the cost of WiMAX end-user terminals compared to mobile phones can be a potential hurdle.

For licence-exempt use, WiMAX power emissions need to be limited which results in limited range and mobility. License-exempt use could therefore lead to licensed use: companies would first validate their business cases using license-exempt frequency bands and then provide their services widely using licensed frequency bands. "Balancing the Use of Licensed and Licence-exempt Spectrum" is identified as one of the three *Regulatory Principles Applied in Ireland to Successfully Promote Wireless Broadband*.

WiMAX has to co-exist with other wireless technologies in both licence-exempt and licensed frequency bands, however using WiMAX and WiFi in the same frequency bands can reduce WiFi performance. WiMAX nodes transmit without checking whether doing so interferes with WiFi and other wireless nodes. While network operators should be free to select the wireless technology they want, their choice should not interfere with the choices made by others. Where congestion might occur, licence-exempt use might require consideration (politeness) of other service providers and their technologies. The relation between licence-exempt use and congestion is discussed in [Module 5 Section 1.5.3](#).

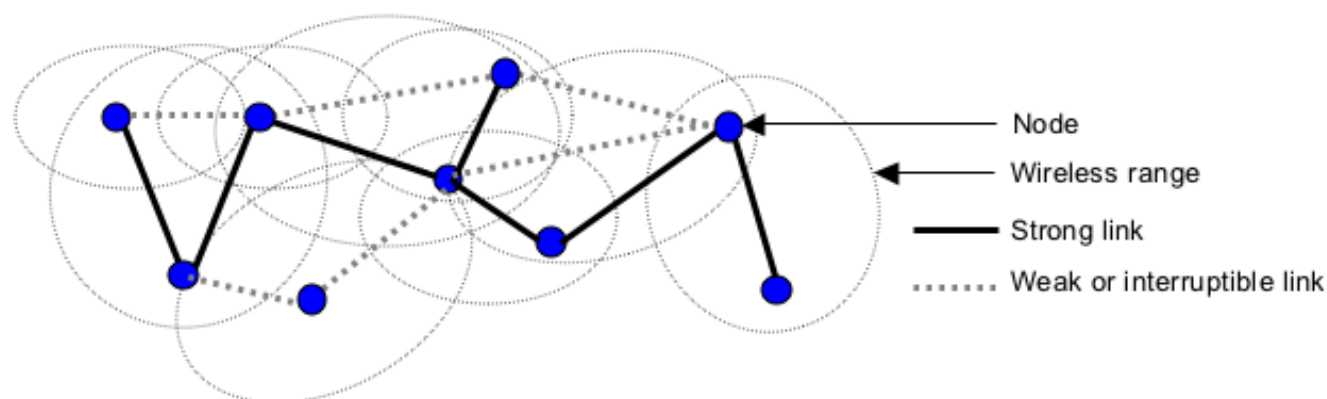
As in other cases, frequency harmonization can help reduce costs by creating economies of scale and reducing end-user terminal complexities. This in turn improves the feasibility of serving rural areas and low-income customers. Coverage could also be increased by using frequencies below 1 GHz. [5]

Wireless Mesh Networks

Mesh networking is a way to route data and voice between multiple nodes. It allows for continuous connections and reconfiguration around paths that may be permanently or temporarily blocked by topographic or other obstacles, by hopping from node to node until the destination is reached. IP networks can do this anyway, but mesh networks can do it more rapidly, by using the ability of nodes to sense how good transmission are on particular links.

An illustration of a wireless mesh network is provided in the figure below. The diagram illustrates that each node has a radio transmission capability, which differs in strength of reception due to topographic conditions. Solid lines represent strong signals, whereas dotted lines represent weak signals that may be blocked at certain times due to weather or other atmospheric conditions. Under all scenarios, the link from one edge of the network to the other is possible through one route or another. Line-of-sight is not necessarily required.

Figure: Mesh Network Architecture



Mesh networks can adapt themselves to exploit all possible links between nodes that are not blocked. Because of this, mesh networks are highly resilient and can be given higher collective data rates just through connecting extra nodes, without much network planning. This is particularly useful in situations needing rapid actions, such as disaster recovery. Even nodes that are user terminals can relay signals rapidly. Generally, mesh networks can cover large distances easily.

Mesh networks may use wireline or wireless links, and may have fixed or mobile nodes. The most important cases of mesh networking have wireless nodes, and, often, mobile nodes. They are especially challenging, as the links can appear and disappear as the nodes move [6]. A potential use might include communication with nomadic people and keeping track of livestock. An experiment that may exploit mesh networks as a method for developing UAS is described in the Practice Note *Nomadic deployments in Norrbotten County in Sweden*.

Some wireless technologies (such as CDMA or GSM) are not well suited to mesh networks because interference between nodes is difficult to control. By contrast, WiFi is often well suited to mesh networks. Many municipal WiFi networks have been structured as mesh networks.

WiFi mesh networks, usually in urban settings, typically have many relatively inexpensive nodes close together, instead of few widely separated nodes with high performance antennas, radios and masts. They can work well in towns if equipment can be attached to buildings or lampposts and if damage and theft are unlikely. As they can adapt to use any available links, they might also be suitable in informal settlements or rural areas (where vegetation may grow to weaken the signals) if the nodes can be close enough together or very well sited. Still, their role in providing UAS is likely to be small compared with the roles of other technologies.

END NOTES

1. See [Govt's Rural Telephone Scheme \(RDEL\) through Reliance Communications closes by March 31, 2007](#) (Reliance Communications, March 2007).
2. See [Long Distance WiFi Trial](#) (Ermanno Pietrosemoli, EsLaRed-ULA, May 2007).
3. Information is available from the [ITU News](#).
4. For a [country-by-country summary of the licensing requirements for WiFi](#).
5. See IMT: finding solutions that satisfy everyone (ITU-R M.1645) in: ITU New October 2007
6. For an account of the strengths and weaknesses of such networks see [Final Report - Study of Efficient Mobile Mesh Networks](#) (Steve Methley and others, Ofcom, January 2006).

8.2.6 Satellite

In addition to their use in broadcasting, satellites can be appropriate for universal access (public access points) to telecommunications and the Internet. However, their use is usually confined to Very Small Aperture Terminals (VSATs). The costs compared to alternatives such as terrestrial radio and wireless access networks limit VSAT applications to relatively remote areas. VSAT has a successful record for providing fixed public access telephony in many remote areas worldwide, including Chile, Peru, Colombia, South Africa, Nepal and Mongolia (consider Output-Based Aid in Mongolia: Expanding telecommunications services to rural areas).

Associated with VSAT technology, satellites are also used as long distance trunking to a minority of remote rural exchanges and mobile base stations in a large and diverse number of countries.

VSATs are also well suited for the provision of distance learning and tele-health applications in very remote or distant areas. The Practice Note *Distance learning using VSATs in the Solomon Islands* describes this type of scenario.

8.3 Broadband and the implications of using IP

There is currently a strong emphasis on using IP in the access and backbone networks to support all ICT services. This must be understood in the context of general trends towards deploying broadband networks. As noted in the introduction to this module, the deployment of IP and broadband networks is inevitable and commercially driven. The main reasons for the move to IP are:

- The Internet has demonstrated that IP networks can grow large, be used enthusiastically by the public and are capable of triggering the development of many new applications;
- Applications can exploit IP networks much more readily than they can exploit traditional telephone networks;
- Voice Over IP (VoIP), often in the form of voice over the Internet, is bypassing traditional telephone networks and has increasingly acceptable voice quality as well as low cost.
- IP Television (IPTV) and related applications can resemble existing conventional broadcasting but also offer extra capabilities through the use of software on personal computers instead of special-purpose equipment. The end user can pick and choose and not have to rely on the broadcaster to decide when and where broadcasts may be viewed. IPTV also leads to the concept of the end user becoming a content provider / broadcaster;
- Traffic for users of different services, and with different and changing capacity requirements, can be carried efficiently over IP networks; and
- The drift towards IP is making traditional telephone network equipment more expensive, and even impossible to buy, as equipment vendors are encouraging customers to invest in new networks.

The overall implication of the above is that universal access and service (UAS) policies need to take into account the potential of the Internet and IP networks for much broader use than delivery of conventional telecommunications and Internet services. This points to the inclusion of broadcasting within a multi-sector, multi-media UAS policy (as well as within regulatory authority generally).

Service providers recognise that future networks will be largely based on IP and that they will be required to support an increasing range of services of ever increasing bandwidth. This is central to service providers' interest in Next Generation Networks (NGNs). The migration to NGNs affects UAS policies in ways that are discussed in [Section 8.3.1](#). For a deeper discussion of regulatory issues related to NGNs, see [Section 2.5](#) of this module.

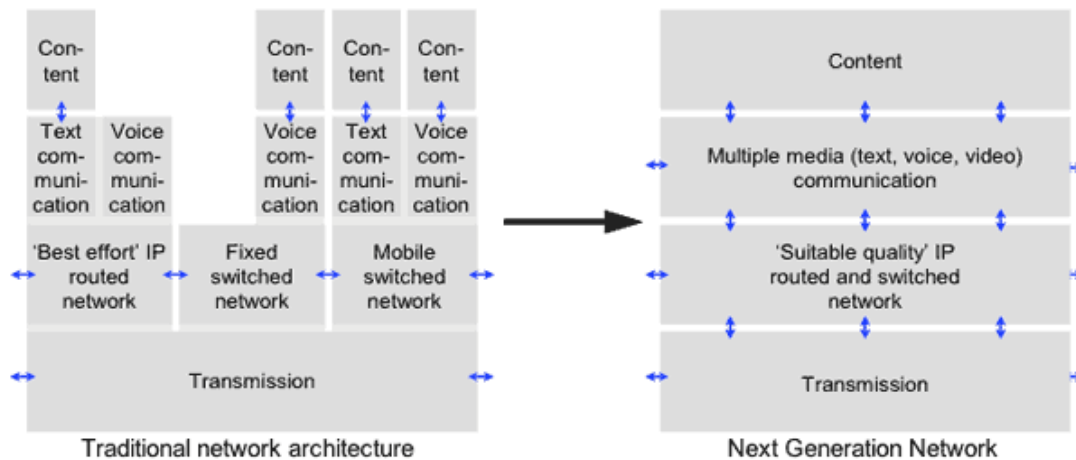
The Internet can affect telephony policy, described in [Section 8.3.3](#), as well as broadcasting, as described in [Section 8.3.4](#). Universal Internet access itself – at least in the form of Internet Points of Presence throughout the country - must be included in the scope of UAS policies, at least for main population centres (e.g., district centres) and educational institutions. The implications of this for content provision are outlined in [Section 8.3.5](#).

8.3.1 Next Generation Networks

In [Module 7 Section 1.4](#), the term Next Generation Network (NGN) is used both broadly, to cover new technologies and services, and narrowly, to refer to a network using IP to deliver multiple services with quality of service guarantees. This section uses the term narrowly in looking at the effects of Next Generation Networks (NGNs) on universal access and service (UAS); the effects of new technologies such as WiFi and WiMAX are described in [Section 8.2.5](#) and new services such as VOIP in [Section 8.3.3](#).

In the past, different services have been supported by different networks: specific transmission and switching networks have carried specific services. By contrast, NGNs support different services independent of the transmission network: they separate the services from the transmission network by using the transmission network to carry IP and the IP network to carry the services. Changing networks into NGNs gives them separate layers for transmission, IP, services and content. The figure below illustrates what happens when networks are migrated to NGNs.

Figure: The separation of network layers in NGNs



Source: [ICT quality of service regulation: practices and proposals](#), Robert Milne, ITU, August 2006.

NGNs' relevance to UAS is discussed extensively in *What Rules for Universal Service in an IP-Enabled NGN Environment?* and *NGN and Universal Access*. Issues with NGNs that may offer opportunities and changes are:

- **Separation of services from networks.** NGNs allow services to be independent of networks. This can separate the role of service provider from the role of network operator. In this environment, service providers are best able to determine rural revenues and business opportunities, but network operators make the main investments in NGNs.

This can lead to a situation where one or several service providers might be willing to provide services but no network operator is willing to build a rural network. In these circumstances, policy-makers might consider distributing Universal Access and Service Fund (UASF) finance to either network operators to build networks or service providers to provide services; the latter then could in turn entice network operators to invest. Migration to NGNs will likely lead to additional hurdles to overcome and challenges for coordination between potential operators in rural areas and this may call for regulatory intervention.

The degree of separation between service providers and network operators will vary between countries depending on the case and how NGNs actually evolve. UAS policies for use of funds need to be decided on a country-by-country basis.

Service providers (fixed and mobile) in developing countries are aware of cost saving efficiencies associated with NGNs in core networks. In Brazil, India, Mongolia, Kazakhstan and Vietnam, providers have already announced plans to migrate to NGNs for their core networks. Also, in Argentina, Bangladesh, Brazil, Bulgaria, Pakistan, Venezuela and Vietnam providers have initiated fibre to-the-x (FTTx) projects. At this stage, however, the high costs and uncertain returns limit such projects to high population, high-income areas.

- **Deepening of the digital divide.** NGNs are expensive to build, even in urban areas. In fact, some network operators (e.g., in the United States) plan to sell rural assets to finance building NGNs elsewhere. Business cases for NGNs that depend on increasing revenues (not just on decreasing costs) are likely to assume that new services are provided only in selected urban areas. Other areas will not benefit from the NGNs unless their access networks can also support the new services. In particular, the data rates available in urban areas may need to guide the design of wireless networks for rural areas to avoid deepening the digital divide between urban and rural areas
- **Requirement for broadband.** Universal access to NGNs requires universal access to broadband. Though the impetus to increase the ubiquity of broadband networks has its own origins and does not depend on NGNs, many UAS policies have concentrated on increasing last mile access to telephony at low data rates. This is changing, but if rural areas are to benefit from NGNs, the NGNs are likely to require broadband backhaul, at least from district centres, public access points and educational institutions. The backhaul could terminate at Internet eXchange Points (IXPs) that themselves might depend on UASF finance.
- **Need for suitable content.** Introducing NGNs raises the importance of telecentres and other forms of public access to the Internet relative to payphones, provided that they make suitable audio and video content available (e.g., in relevant languages). If NGNs are to offer more than what is already available through telephony and broadcasting, the IP applications should fulfil the user requirements outlined in [Section 8.3.5](#).
- **Elaborate implementation.** The standards for NGNs are complicated because they cater to fixed and mobile networks and for old and new services with good security and quality of service. Expertise in this area could take years to develop. Developing countries with very limited and old networks could find it difficult to leapfrog and implement these standards. On the other hand, precisely because many developing countries do not have extensive circuit-switched networks, they could possibly leapfrog to implement directly a fully IP-enabled NGN from the outset, as opposed to making a slow migration as in the case of more advanced countries. Irrespective of this, of course the complexity of technically implementing NGN standards as well as concerns regarding the level of investment needed remain.

- **New interconnection arrangements.** The introduction of NGNs typically changes the locations and functions of points of interconnection and requires interworking with legacy networks. Points of interconnection move from expensive town centres to less expensive business parks, and include equipment to convert between data recognised by IP networks and data recognised by other networks. The costs of these changes need to be shared equitably. Ultimately, both parties to the interconnection agreement are likely to benefit.

Introducing NGNs also opens up the possibility of changing the pricing of interconnection to arrangements such as sender keeps all (as adopted in Internet peering). These arrangements are usually unsuitable for rural network operators, especially if they have historically enjoyed asymmetric interconnection pricing. Interconnection arrangements are examined in Interconnection Challenges in a Converging Environment: Policy Implications for African Telecommunications Regulators and NGN Interconnection and Access.

- **Requirements to reduce regulation or to introduce regulatory forbearance.** In some countries incumbent service providers have requested that regulators encourage investment in NGNs by reducing the effects of regulation. In Hong Kong, China, there have been suggestions that the cost of UAS provision should be calculated by combining the cost of the existing network and the cost of the NGN. The regulator has rejected these suggestions and will consider the cost of the NGN only where the change to the NGN stops the existing network from providing UAS [1].

Generally, investments in NGNs are motivated by the benefits derived from the convergences of dedicated networks such as the PSTN, broadcast networks and the Internet onto a single network. This convergence saves costs through network consolidation and elimination of local exchanges, which means customer premises can be connected with higher-level data switching capabilities. NGNs also allow operators to increase revenues by making it possible to offer multiple services (e.g., voice, video, data) and innovative new services, over a unified network. Investments in NGNs should not affect UAS requirements (except, perhaps, by lowering cost). Regulators need to determine where the issues lie in each case.

- **Scale, scope and monopoly.** The EU regulators views expressed on these issues for access networks are provided in the ERG Opinion on Regulatory Principles of Next Generation Access. The ERG identifies as a significant issue for regulators the fact that economies of scale and scope are reinforced by NGNs. The report indicates that in some locations, there could be natural monopolies “in certain areas of the electronic communications value chain”; for example, one fibre, cable or duct, controlled by one service provider, might be enough for fibre to the curb. Since the effects of scale and scope will vary from country to country and even within countries, the ERG concludes that it is unlikely that a common regulatory approach would work for all countries – or even for all regions within a country. The impact of scale effects in different parts of a country could make the market structure more heterogeneous since NGNs would not be rolled-out everywhere simultaneously.
- **Compliance with normal regulatory requirements for services:** The transition to NGNs will be accompanied by increased use of VoIP whether a fixed line network or a mobile network is used. In the context of UAS, the migration to VoIP raises a number of issues that revolve around quality of service (QoS) and access to emergency services. Currently, VoIP calls differ in terms of quality and reliability from voice over the PSTN; VoIP is more susceptible to Internet-related technical problems and, in the case of fixed line VoIP, reliant on electrical power supply for calls. VoIP services normally do not include free calls to emergency numbers, the automatic rerouting of emergency calls to the nearest emergency call centres, or caller identification (see also [Section 8.3.3](#)).

The shortcomings of VoIP in comparison to voice over the PSTN have led regulators to introduce a variety of different measures regulating the provision of VoIP [2]. But mandating VoIP to have the same QoS and emergency related features as voice over the PSTN increases the cost of providing the service. Given that the affordability of VoIP's makes it very attractive, light-handed regulatory measures may be more suitable to strike a balance between meeting consumer expectations and lowering costs.

- **Enhanced competition.** The expected advantages of NGNs are that users will have access to an increasing variety of service providers, assuming the number of viable service providers increases when they do not have to provide their own networks. This should stimulate price competition and incentives to provide new services.
- **Fixed-mobile convergence:** NGNs will also tend to increase the availability of multiple services through any kind of device, assuming the basic infrastructure becomes common to all. The Telecommunications Regulatory Authority of India [3], for example, estimated that 70 per cent of mobile calls are originated and terminated inside fixed locations. If NGN is implemented in end-to-end networks, such in-building or fixed-location mobile calls could possibly be completed on fixed networks, resulting in cost savings and more efficient utilization of scarce resources like spectrum. Of course, such concepts assume that users would be interested in switching from fixed to mobile on a price-basis [4].

END NOTES

1. See [Review of the Regulatory Framework for Universal Service Arrangements](#) (OFTA, June 2007), .
2. For example, in Canada the Canadian Radio-Television and Telecommunications Commission (CRTC) mandated VoIP providers to offer emergency 911 services. In addition, they were obliged to notify customers about limitations to their services.
3. [TRAI, Consultation Paper on Issues Pertaining to Next Generation Networks](#) (NGN), 12 January 2006, Consultation Paper No: 2/2006.
4. For further reading on this issue, consult the ITU's Trends in Telecommunications Reform 2007: The Road to Next Generation Networks (NGNs), Chapter 4 (Fixed-Mobile Convergence.)

8.3.2 Contribution to universal access funds

Traditionally, the contributors to Universal Access and Service Funds (UASF) were the providers of voice telephony services, though both fixed and mobile operators have become much more than voice service providers. However, with the trend to use of VoIP, data and multimedia services, existing methods of funding universal access and service (UAS) may become unsuitable. The general trend for UASFs in developing countries is that levies should be made on all communications service providers, with the only exceptions being exemptions for companies below a certain level of revenue.

Examples of issues that have arisen, even in relatively advanced countries, which are in fact exceptions to the general rule, are:

- In Hong Kong, China UAS is financed by a levy on the revenues from international gateway switches. Because international VoIP traffic does not use these switches (and because tariffs have been falling), revenues have been declining. As explained in Review of the Regulatory Framework for Universal Service Arrangements, the regulator has now decided that UASF finance will be provided by a levy on the quantity of telephone numbers (whether fixed or mobile) allocated to service providers. The decision treats VoIP providers in the same manner as conventional fixed and mobile operators, however, the regulator ignores peer-to-peer calls between computers, which do not access the public telephone network and which therefore do not use telephone numbers.
- In Canada, UAS finance were provided by a levy on the revenues from calls other than VoIP calls. As explained in Regulatory framework for voice communication services using Internet Protocol, the regulator adjusted the regulations to make them technology-neutral by introducing suitable obligations and rights for VoIP providers. In particular, the levy providing UAS finance is based on revenues from all calls except peer-to-peer calls, but is paid only by service providers that have revenues of at least 10 million USD.

Generally, UASFs can be compatible with the development of VoIP if contributions to them are calculated in technology-neutral ways. However, further revisions would be substantial if peer-to-peer calls between computers, which are typically made without charges to callers, were included. Thus they should probably not even be counted, let alone assessed for revenues.

8.3.3 Substitution for telephony

Voice calls and text messages alone do not need IP, but when other interactive applications are used, the case for using IP is clear. Even then, VoIP is likely to be the most popular broadband application for many beneficiaries of universal access and service (UAS). Surveys in The Economic Impact of Telecommunications on Rural Livelihoods and Poverty Reduction show how important voice calls and text messages are in poorer countries, compared with other uses of ICTs. However, providing VoIP in public access points (e.g., cyber cafés) might encourage people in these communities to try out other IP applications.

Voice over the Internet (VoIP) takes various forms. One widespread distinction is between VoIP that uses managed IP networks (such as corporate networks and NGNs) and VoIP that uses the Internet (which is sometimes termed “voice over the Internet”). VoIP that uses the Internet does not have quality of service guarantees: calls may fail to be set up, become unusable or be dropped. Service quality guarantees are particularly significant when traffic is growing more rapidly than network capacity.

VoIP is cheap, so it is popular despite limitations in the UAS obligations that it can satisfy. These limitations typically relate to emergencies: as outlined in [Module 7 Section 4.4](#), many VoIP implementations do not work when the main electricity supply fails, do not connect emergency calls or do not automatically pass location information to emergency services.

From the perspective of general quality of service as well as UAS, these limitations are serious in areas where users have expectations formed by fixed wireline networks. They are less serious, however, where users have expectations formed by mobile networks which often have similar limitations, or where emergency services are unable to respond rapidly for other reasons. Regulators need to protect users by ensuring that any serious limitations have sound economic or technical justifications and are explained carefully to users.

VoIP for peer-to-peer calls between computers is likely to spread without any intervention by regulators beyond making it legal. Calls based on IP that access the public telephone network can be encouraged by making phone number allocations technology-neutral and service-neutral and by giving VoIP providers the right to negotiate interconnection agreements with other telephone network operators. There is a discussion of VoIP regulation in [Module 2 Section 4.4](#).

Regulators can support the use of VoIP in UAS in other ways provided they are convinced that the promotion of VoIP actually contributes to the policy objectives. In particular, they could allocate UASF finance to enhanced network capabilities including VoIP exchange points, which move VoIP traffic between networks, and ENUM (Electronic Numbering Mapping) systems (which map phone numbers into information for use in VoIP routing). VoIP exchange points and ENUM systems are best supported by regulators in ways like those described for Internet eXchange Points (IXPs) in [Module 2 Section 4.8](#). Regulators should encourage VoIP providers to co-operate in developing such network capabilities. However, they should not impose particular implementations and might not need to provide funds. For instance, they should not require the use of ENUM systems as these are not necessarily the best way of mapping phone numbers into routing information.

8.3.4 Substitution for broadcasting

Broadcasting is popular and widely available, often more than telephony. Radio and television can be powerful educational tools. Many countries recognise this by having universal access and service (UAS) policies for broadcast content, having public service broadcasting arrangements and obliging commercial broadcasting service providers to carry certain content. UAS policies should note that expanding telephony and broadcasting may, in some cases and during certain early phases of development, be more effective and less expensive than providing IP networks unless there are needs or demands for interactive applications and Internet access.

However, the use of Broadband IP networks for television programme distribution is a development that telecom operators are seeing as an opportunity that enables them to offset revenue declines from traditional services as well as to “hit back” competitively, through telecom/media convergence, especially in broadcasting markets previously dominated by cable TV operators [1].

IPTV involves transmitting television programmes over IP networks [2]. As with VoIP, discussed in [Section 8.3.3](#), there is a distinction between IPTV that uses managed IP networks and IPTV that uses the public Internet (which is sometimes termed Internet television or web television). IPTV that uses the Internet is likely to have no quality of service guarantees. In fact, in standards it is not regarded as IPTV at all, as mentioned in [Module 7 Section 4.5](#).

In their digital forms, radio and television can offer on-demand programmes and interaction with the user. In contrast, broadcasting does not offer the same variety or creativity as the Internet. Also, it usually confines users to walled gardens that allow access only to information chosen by the service providers. By contrast, providing IPTV might encourage users to experiment with other IP applications. In some countries, IPTV might be more beneficial for national development through UAS than digital television.

END NOTES

1. See ITU's Background on Digital Resources for Digital Content www.itu.int/osg/spu/stn/digitalcontent/resources_topics.html, in particular IPTV-Market, Services, Regulation, Standards, Presentation by Reinhard Scholl, ITU-EBU Workshop on Competitive platforms for the delivery of digital content, 21-22 June 2007, Geneva, at: www.itu.int/osg/spu/stn/digitalcontent/Presentations/Day1/Session3/Scholl.ppt#374,2,Swisscom
2. See for a more comprehensive definition: "The term IPTV can cause some confusion. In narrow terms, IPTV is defined as the provision of video services (e.g., live television channels and near video-on-demand (VOD) or pay-per-view) through an IP platform. However, some define IPTV services to encompass all the possible functionalities associated with an IP platform. For example, some define IPTV services as multimedia services, such as television services, video, audio, text, graphics, and data, which are provided by an operator over a managed IP-based network for delivery to the consumer. This encompasses not only linear video services but other ancillary interactive video and data services, such as Video On Demand (VOD), web browsing, advanced email and messaging services. The interactive services associated with IPTV allow the viewer to determine what and when to watch, and also allow the user to teleshop or order movie tickets using the IPTV service. IPTV providers now commonly include in their commercial packages a personal video recorder (PVR) through a hard disk in the set-top-box (STB) or on the network, allowing 'time-shifted' viewing of TV broadcasts or 'catch-up' viewing if the viewer pauses a live broadcast programme." in the 2008 GSR discussion paper on IPTV and IPTV and Mobile TV: New Regulatory challenges for Regulators, available at: <http://www.itu.int/GSR08>.

8.3.5 Provision of content

IP supports many new communications applications, however several types of applications that are used extensively in urban centres may not be first choice in rural and remote areas of countries where people have little formal education and low literacy rates. Sometimes, radio and television, along with voice communications, are more effective in spreading information to these populations than email or web pages.

In general, to have the greatest effect, content and applications specifically developed for rural areas need to consider the following requirements:

- Tolerance of inadequate links in networks. In some locations or at some times, applications might need to use narrowband networks instead of broadband networks. The narrowband networks might have poor quality phone lines, or short wave radio transmissions that support email but not web access, as described in the Practice Note Short wave radio in the Solomon Islands.

Applications that can be used in these situations should minimize the data that is transferred across the Internet, by following guidance to make web pages compact [1]. Failing that, web pages can be read after removing graphics as demonstrated in the Practice Note The Loband web interface.

- Distinctiveness from existing alternatives. Applications should offer more than what radio and television offers. Unless applications are informational alone, involving searching for and displaying information, they should be interactive; applications might allow users to play educational games, undergo health checks, complete forms or take part in tutorials and on-line tests. However, as stressed in Section 1.6.2 in the case of government applications, there needs to be careful planning and designing of these types of applications if they are to be widely used.
- Acceptance of low levels of literacy. Applications should exploit the capabilities of ICT to avoid requiring high levels of literacy or

knowledge of foreign languages. Typically, except where applications are designed for classroom use, they should provide spoken help messages and encourage spoken contributions to on-line forums. In fact, applications might be convergent; by exploiting multiple network technologies they could provide co-ordinated release and exchange of information in radio programmes and on-line forums.

- Robustness. In many places, applications and other programs will have unskilled users or inexperienced system managers who must maintain the stability of the terminals from as far as possible. When problems occur (because of viruses, for example) or software is to be upgraded, local people must be able to maintain terminals through simple operations (e.g., typically just by restarting them).
- Security. Security problems with applications on the Internet are so notorious that many people are willing to use more time-consuming and labour-intensive ways of doing business. These problems are discussed in the Information Technology Security Handbook and Cybersecurity Guide for Developing Countries.
- Assistive design. The content should also be planned to eventually incorporate features that are appropriate for use by people with disabilities.

END NOTES

1. See [Web Design Guidelines for Low Bandwidth](#) (Aptivate, 2004).

8.4 Terminals

Advances in technologies as well as economies of scale are lowering the costs of user terminals or information appliances such as phones and computers. With the trend to convergence, technological advances are also blurring the distinctions between types of terminals. There are a range of different devices:

- handheld computers known as personal digital assistant (PDA);
- phones combined with video cameras and music players;
- mobile phones that are also Internet-enabled mini-computers (e.g. the Blackberry and other equivalent devices which enable e-mail and web-browsing among other wireless services); and
- powerful handheld 3G end-user terminals that provide “triple-play” services – telephony, Internet and IPTV and mobile TV.

For the purpose of universal access and service (UAS), this section focuses mainly on phones and computers.

8.4.1 Handsets: Phones and PDAs

With strong encouragement from service providers, equipment vendors have been developing low-cost mobile phones. In 2007, 2G phones were available for as little as 30 USD, and 3G phones were available for 130 USD.

The 30 USD price for an individual mobile phone is still too much for at least 1 billion people, so some mobile phones are now being designed for sharing. In fact, entire systems for shared access have been designed [1]. These systems include not just the phones, but also power generators, marketing material, directional antennas, user guides and training. A power generator can be a solar panel or a human power generator (wind-up or step-on) as phones consume at most 5 W. Programs for sharing phones and the Subscriber Identity Module (SIM) that store tariffs and calculate the charge for each call make phone sharing easy, affordable and viable.

Trials of systems for shared phone access indicate that typically 30 people share one phone. Some case studies of shared access are described in Development Fund Annual Report 2006. These systems illustrate one way in which countries can move gradually from universal access to universal service. As service becomes more affordable and people's perceived or real need of a personal phone increases, the number of people sharing a phone can fall. Of course, even without specially designed phones, several people can use one phone on a commercial basis. This is common in several village phone programs around the world (see [Section 3.3.1](#)).

Some regulators discourage the reuse of second-hand phones from other countries for various reasons (e.g., how to set (or lift) import duties for low priced, second hand phones raises issues which are not necessarily easily resolved; and some believe that the second-hand market increases the possibility of theft). However, the reuse of existing phones has helped to increase demand in various countries. In Burkina Faso, phones provided for reuse through an NGO in Switzerland sell for prices between 7500 CFA (15 USD) and 45000 CFA (90 USD), depending on the phone features [2].

The market grows faster when there are no unnecessary barriers to the use of phones. Common barriers include high import duties and laborious approval procedures. Type approval regulations are best designed to avoid inessential country-specific requirements and to allow mutual recognition of the testing and certification processes of different countries. As observed in [Section 8.2.5](#), widespread type approval is one reason why WiFi is so popular.

Personal digital assistants (PDAs) of various kinds have been successfully used as an inexpensive and, due to portability, more practical

alternative to computers and conventional Internet connections in health applications. They are especially useful for data collection (such as on vaccination and on disease management) as well as for information dissemination (e.g. on disease treatment or prevention). Also, mobile phones, if equipped with a camera and able to send photos, can be used for applications such as remote diagnosis.

END NOTES

1. For a further discussion of sharing end user devices that provides additional examples and touches on other matters mentioned in this section see End-User Sharing. Michael Best, ITU, February 2008. www.itu.int/ITU-D/treg/Events/Seminars/GSR/GSR08/discussion_papers/End_users_final2_web.pdf
2. See Kongoussi: the economic benefits of second-hand cell phones (IICD, June 2007), www.iicd.org/articles/Kongoussi/

8.4.2 Computers

Many projects have tried to develop and provide inexpensive computers using advances in display and storage technologies (e.g., flash memories) [1]. These computers are also designed to have low power consumption and thereby reduce the cost of power generation.

One of the more prominent initiatives to provide low-cost computers is the One Lap-Top per Child (OLPC) initiative. Started in 2005 by faculty and researchers of the MIT's Media Lab, this initiative aims to provide children worldwide with new opportunities to explore, experiment and express themselves. The XO was designed to be flexible, low-cost, power-efficient and durable. It uses free and open-source software. The XO, originally intended to cost 100 USD, ended up costing 188 USD, mainly because little or no large quality purchases were forthcoming from governments as expected. The first production units were delivered in December 2007. Other small, inexpensive computers such as Intel's Classmate PC and the Asus Eee PC were also released in 2007 to address the demand for low-cost computers.

Though computers can cost less than 200 USD, this is still too high for many educational institutions. Because of high costs for individual computers, there are projects for sharing computers just as there are projects for sharing phones.

In these projects a single server computer, with a 2G or 3G modem, runs open source programs and stores data for multiple client computers connected over a LAN. This form of shared access should save costs by sharing the use of 2G or 3G links, open source programs and storage. Eventually, these savings (except those due to shared 2G or 3G links) might shrink as computer costs continue to fall. An example is the Jhai PC/ Jhai Network, which is currently field-tested. It is a thin client/ server technology based on the netPC system, providing a simplified desk-top for the end-user, while the operating system and applications are stored and accessed through the server. Advantages are that end-user terminals are cheap and consume little power, and that they are easy to manage and upgrade (as it can be controlled centrally by skilled staff). The disadvantage is that it requires a constant and fast connection to the server and that might not be available in some rural areas. It also requires a sufficiently sized server for the number of end-users.

An alternative to the use of new computers is the reuse of used computers from other countries. However, these sometimes consume too much power (perhaps 120 W for a desktop computer and 80 W for an old display, or 40 W for a laptop computer), or are too fragile especially for rural and remote areas.

Another consideration is that the cost of applications can exceed the cost of computers. Having said this, many applications and other programmes are available as open source software or even free software. Open source software is free for alteration, in that users can tailor it for their own purposes and is often also free of charge, though there may be (generally modest) charges for maintained and documented versions. Free software is not necessarily open source software; for instance, several web browsers, document readers, VoIP phones and other programs for client computers are free but not open source software.

Open Source Software Perspectives for Development and Free/open source software (FOSS) policy in Africa: A toolkit for policy-makers and practitioners set the context for the use of open source software in developing countries. The Practice Note Examples of open source software lists some open source (and free) programs. These are only examples: they are not necessarily endorsed in this toolkit, and there are many other options.

The cost of computers is not the only obstacle to their effective use. Often most of the equipment cost is due to the power generators, not the computers. The total cost of ownership must factor in not just equipment cost but also operating costs. Other considerations besides cost, are that there must be suitable applications, trained supervisors and motivated users [2]. An introduction to some of these issues is provided by Making the Connection: Scaling Telecentres for Development.

END NOTES

1. [1] For a list of such projects (some of which have now ended) see www.infodev.org/en/Publication.107.html.
2. [2] For a list of documents about telecentre development see www.infodev.org/en/Publication.190.html.

8.5 Relationship with the environment

ICTs have a complicated relationship with the environment, having the potential for good or harm. This section considers that relationship of ICTs with the environment in terms of various specific topics. For all these topics there are implications for ICT policy and regulations, which may work with or against the achievement of universal access and service (UAS).

This issue is included in the technology section since environmental requirements are typically applied at the equipment level, even though the impetus might come from policy.

The effects of ICTs on the environment are often not reflected in immediate costs. In these circumstances, policies and regulations might need to depart from being technology-neutral, as explained in [Section 8.1](#).

8.5.1 Reuse of equipment

Organising the reuse of existing equipment such as phones can be an effective way of making ICTs available to people who otherwise would not have them. Reputable organisations in developed countries make phones and computers available for re-use in developing countries. However, some schemes use these programs to simply dump largely worthless equipment. For example, between 25 per cent and 75 per cent of the equipment arriving for re-use in Nigeria is reported to be incinerated or dumped. Regulators in developing countries can help this situation by issuing lists of reputable organisations that distribute equipment that adheres to performance standards and limits on hazardous content.

Sales and marketing practices can make equipment valueless or obsolete in a short time and potentially turn it into waste. For example, sometimes music (MP3) players are promoted as fashion items, or phones are subsidised by subscriptions or call charges as well as being replaced by new competitive offers on a periodic basis. Regulators could discourage or even prohibit such practices, though it is not easy or advisable to interfere with competitive practices.

Some market regulations can create beneficial results from cutting across common sales and marketing practices. For example, Finland in 2003, in contrast with many countries, did not have phone subsidies because there was a prohibition on locking phones to particular service providers. This probably contributed to the success of mobile number portability; once introduced there was an immediate impact in terms of subscribers changing provider, and resulting reduction in call charges.

However, it is impossible to make a direct link between this and favourable environmental impact. Since the environmental impact interplay is often complex, it is not possible to generalize on the benefits of policy, though it would appear that this case might have had benefits to both market competition and the environment.

8.5.2 Recycling of equipment

Ultimately, all equipment fails or becomes obsolete and its components need to be recycled. Laws about unauthorised dumping of equipment are difficult to enforce. In some countries, users are likely to send equipment for recycling only if there is an incentive or obligation to do so. This is typically provided through regulations.

The EU policy encourages users to recycle and places obligations on manufacturers, importers and distributors of electrical and electronic equipment (according to the producer pays principle). Manufacturers and importers must finance the collection, treatment, and recycling of waste equipment, and distributors must let users return waste equipment free of charge. To make recycling less hazardous, manufacturers and importers must limit the proportions of certain substances in equipment. Similar regulations apply to batteries and accumulators, with extra restrictions (e.g., untreated industrial and automotive batteries and accumulators must not be incinerated or dumped in landfill). The Practice Note Rules for the recycling and disposal of electrical and electronic equipment in the EU outlines regulations implementing the EU policy.

The equipment itself should be designed to adhere to standards for environmental performance such as those summarised in the Practice Note The IEEE 1680 standard for the environmental performance of electronic equipment. In the EU, there is a systematic attempt to embed requirements for improvement of environmental effects in the very early stage of equipment design (e.g., there are codes of conduct to cut the power consumed during stand-by operation of equipment such as DSL modems, power supplies and televisions).

8.5.3 Alternative power sources

Supplying power to remote ICT network sites is a significant cost element in any network serving rural regions.

When network reach rural and remote areas ahead of the main electricity supply, alternative power sources are necessary. Diesel power generation is common, but technological developments have made it increasingly possible to consider renewable power sources that do not increase net greenhouse gas emissions. These energy technologies are becoming progressively less expensive and more practical.

Solar, wind and water (micro hydro plants) generation is feasible in many places as are combinations of alternative energy sources (e.g., joint solar and wind power generation in Namibia). For individual terminals, human power generation is sometimes used as in pedalling, where a human can generate 20 W or even 40 W fairly easily.

A basic overview of the main alternative power sources, as well as network technologies, is provided in New Technologies for Rural Applications. However the following two web-based toolkits provide the most up-to-date and useful guidance on this subject:

- www.eurorex.com/ugtoges/intro.htm Users Guide to Off-Grid Energy Solutions by EuroREX is designed to help those who require energy-consuming equipment in off-grid (mainly rural) areas. A guide to multiple options are considered, including those appropriate for infrastructure systems as well as "audio-visual", office and telecom equipment used at the user level, including telecentres. In each case, typical levels of power consumption are provided and the comparative suitability and cost of power sources, such as Photovoltaic (PV) systems, diesel generator, wind-turbine and micro hydroelectric plants considered. Particular attention is given to the costs and suitability of PV as an appropriate power source. EuroREX is a network of European companies and trade associations focused on renewable energy solutions. It is partially supported by the European Commission.
- www.dot-com-alliance.org/POWERING_ICT/ Powering ICT: An Energy Solutions Toolkit for ICT Projects is a resource developed by the DOT-COM Alliance (sponsored by USAID). The toolkit is designed to help users determine a cost-effective combination of ICTs and energy systems. This toolkit provides equally useful information on Photovoltaic (PV) systems, diesel generator, wind-turbine and micro hydroelectric plants. The toolkit focuses exclusively on the power needs of ICT equipment, mainly computers, local area network and ancillary equipment used for telecentres. It is therefore also an invaluable guide to provide both an understanding of the power options available a step-by-step cost comparison and decision guide. It includes a planning and costing guide for telecentres.

Biofuel power generation is also being tested for network equipment. This could conceivably cut out the costs of transport, storage and consumption of diesel in conventional generator plants. Well publicised trials in Nigeria and India are using oils from groundnuts and jatropha as fuel stocks for powering GSM base stations which might have power requirements of 1 kW each. However, this is controversial because using biofuels might destroy forests, reduce water supplies, raise local food prices and introduce genetically modified organisms. Using biofuels might even worsen climate change; palm oil is said to produce 10 times the greenhouse gas emissions of petroleum. Biofuel obtained from agriculture and forestry waste such as straw and woodchips raises fewer objections but is harder to exploit.

Currently, research and development of battery technology aims to improve the lifetimes of batteries and reduce the dependence on heavy metals, however, progress is slow. Fuel cells based on converting biomass (including dead flies, in one case) are highly experimental and generate insufficient power for phones, let alone computers. Larger fuel cells, typically based on hydrogen or alcohol, might become suitable as back-up power sources for network equipment.

8.5.4 Contributions of Information and Communication Technologies

ICTs can have positive and negative effects on the environment, although the identifiable impacts tend to be positive or neutral, unless contribution to economic growth is considered to be negative.

On the matter of recycling and waste, ICTs may improve waste collection by contributing to better management, but they also produce waste equipment. ICTs may often reduce the need for travel (e.g., a simple phone call may often replace the need to deliver a message personally). As well, ICTs can make it easier to travel (e.g., users are able to find out bus schedules more easily, or to better coordinate meetings and other travel related events).

The balance between the good and the bad depends on policies in ways that are not yet fully understood, though a useful attempt to examine the balance for the EU is reported in The Future Impact of ICTs on Environmental Sustainability.

There are some specific suggestions for positive programmes in a developing country in Using ICTs for Poverty Reduction and Environmental Protection in Kenya. More generally, even in developing countries, regulators, service providers and equipment vendors can take the steps listed in the Practice Note Simple actions for improving the environmental effects of ICTs.

For regulators the principal actions involve:

- Ensuring that their own operations set good examples, especially in their use of buildings and travel;
- Encouraging the provision of services (including e-government, etc.) that use telecommunications to reduce travel, thus reducing polluting emissions (CO₂, etc.);
- Requiring that equipment adheres to standards that limit environmental effects, through type approval or otherwise [1];

- Educating users about the strengths and weaknesses of applications that support secure on-line transactions and thereby reduce the use of paper; and
- Contributing to national environmental protection strategies, to ensure that sector strategies include the use of ICTs to reduce greenhouse gas emissions.

For service providers and equipment vendors, ICTs can affect the environment in ways besides those considered here. For instance, network construction and operation can degrade natural habitats by being noisy and ugly. The relevant authorities, who are not usually the ICT regulators, are likely to require an environmental impact assessment for any major project, using guidelines on mitigating impacts such as those in Environmental, Health, and Safety Guidelines for Telecommunications.

Many regulators, service providers and equipment vendors record their plans for environmental protection and periodically report on their actions. An example of an annual report, from the regulator in Hong Kong, China, is provided by Environmental Report 2006/07.

END NOTES

1. For a tool that lists and tests computers that reach any of three levels of acceptability to standards, see Environmental Protection Electronics Assessment Tool (EPEAT), www.epeat.net.