

Module 2. Competition and Price Regulation

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Module 2. Competition and Price Regulation

This module of the ICT Regulation Toolkit was updated in 2011. A prominent theme is digitisation which represents the most significant change to communications in a century, with fundamental implications for both fixed and mobile networks. This revised module puts these changes in context and explains what they mean for regulators and industry players.

[Overview: Putting ICT Regulation in Context](#)

This section discusses the regulatory challenges and opportunities facing all telecoms regulators. Special attention is paid to developing countries but the changes in technology and markets affect all regulators. The critical change is the transition to IP data networks which has separated carriage from content and allowed 'over-the-top' content and applications providers to deal directly with end users over networks whose owners and operators are excluded from these transactions. This section also discusses how policy and regulation intersect in the context of differences between countries and as a result of changes in technology and markets.

[Anti-Competitive Conduct](#)

This section discusses the prevention of anti-competitive conduct. Regulatory approaches and concepts are discussed (including 'net neutrality'). Common forms of anti-competitive conduct are explained with remedies available and case studies.

[Access to Customers and Facilities](#)

Interconnection is a key issue for regulators. The concept of 'open access' has evolved as changes in technology led to different competitive business models. The transition from switched to IP interconnection has changed how open access can be made available. This section also deals with infrastructure sharing as cooperative form of access.

[Regulating Access Prices](#)

The heart of regulation is regulating access prices. It is the key to new entrant business models. The previous section warned of regulatory over-reach on mandating access services because not all inputs are essential, bottle-neck input services - so making them available will deter new investment. This section alerts regulators to how access pricing can also shape competition. This section also deals with cost models and regulatory accounting.

[Regulating 'Over-the-Top' Services](#)

Internet telephony, or 'Voice over the Internet Protocol' (VoIP), is the first 'over-the-top' service with major implications for the business models of both fixed and mobile network operators. VoIP is still a key issue for incumbents and makes early concepts such as call-selection obsolete. Network operators also have to deal not only with erosion of traditional revenues but also increased traffic caused by third-party applications carried over their networks simply as data.

[Mobile and Wireless Network Regulation](#)

Many conduct and access regulation issues are covered in other sections of this module. So the focus of this section is on issues unique to mobile and wireless access networks.

[Regulating Retail Prices](#)

Before competition, price regulation was needed to correct monopolistic tendencies (i.e. restricting output and holding up prices) by the incumbent. With competition, the regulatory focus shifts from regulating retail prices to access prices and maybe neither (e.g. if there is effective infrastructure competition); but not both. However, in the transition to competition, many countries have kept some retail price controls to manage the price rebalancing that comes with the transition from monopoly to competition.

1 Overview: Putting ICT Regulation in Context

Government regulation of ICTs extends into many disparate areas, ranging from pricing regulation, mergers and market entry to content, copyright, and privacy. This module considers challenges and opportunities with regard to competition and price regulation that may be significant for regulators.

This section discusses the regulatory challenges and opportunities facing all telecoms regulators. Special attention is paid to developing countries but the changes in technology and markets affect all regulators. It discusses how policy and regulation intersect in the context of differences between countries and as a result of changes in technology and markets. Specifically, this section provides information on:

- [Challenges and Opportunities for Developing Countries](#)
- [Policy Issues](#)
- [Regulatory Issues](#)
- [Key Developments in the ICT Sector](#)
- [Evolution of Competition](#)

1.1 Challenges and Opportunities for Developing Countries

Establishing a regime to regulate the ICT sector can place significant demands on a developing country's legal and administrative infrastructure. In the context of competition and price regulation, for example, many developing countries do not have the resources to build large costing models. Institutional aspects of regulation are discussed in [Module 6](#).

Compared to developed countries, telecommunications infrastructure in developing countries has a number of features that create both challenges and opportunities:

- Typically, wireless demand in developing countries exceeds fixed demand, which has assisted the rapid availability of affordable telephony.
- Wireless also provides more scope for competition; which should be reflected in less regulation.
- Fibre-based customer access networks are often not yet widely rolled-out. Customers may have limited or no access to either fixed or wireless broadband services, particularly in rural areas.

The fact that traditional fixed technologies are not deeply embedded in many developing countries enables regulators to implement interconnection policies that are more appropriate to wireless networks, [VoIP](#), and other emerging technologies. For example:

- The prominence of per-minute rates is a product of fixed technology. Per-minute rates may be irrelevant, or even counterproductive, when applied to [VoIP](#) services,
- Policies seeking to "[unbundle](#)" network elements assume that the fixed incumbent enjoys a near monopoly position in the provision of critical telecommunications infrastructure. This assumption may not be valid in many developing countries.

The absence of a well-established interconnection regime may allow regulators in developing countries to bypass policies that are no longer appropriate, in favour of arrangements that are sustainable, minimize opportunities for [arbitrage](#) and are more in line with emerging technologies. This is useful market behavior unless the price difference between two services or markets is sustained only because of regulation. If legislatures and regulators do not promptly adjust the regulatory policy that triggered such arbitrage, the impact on the market can be substantial.

All countries are facing challenges and opportunities as digitisation [de-layers](#) networks. Digitisation separates 'carriage' and 'content' services allowing '[over-the-top](#)' services which dramatically impact traditional business models which used 'content' services (eg calls) to subsidise 'carriage' (ie line rental).

Box 1.1: Australia: Arbitrage of Local Calls

Regulation provides opportunities for market entry in unanticipated ways. For example, in Australia an entrant can arbitrage between the different ways the wholesale price of calls is regulated. It is inefficient to

route all calls through the point of interconnect. The interconnection framework suggests that only long distance and international calls will be passed to the POI with PSTN originating and terminating access billed at 1 cent per minute at each end.

Local calls can be resold and are routed as they would be if provided by the incumbent. The reseller is billed 8.9 cents per local call (untimed in Australia).

The break-even point is 4.35 minutes. That is, for business customers where local calls are typically less than 4 minutes long, the entrant can programme the business customer's on-premises switchboard (Private Branch Exchange, or "PBX") to insert an area code so that calls can be presented at the POI as "long distance" calls.

Source: Rates for the period to June 2014, ACCC Final Access Determination, July 2011

1.2 Policy Issues

This section discusses the relationship between the policy and regulatory issues that are particularly relevant to developing countries.

Initially, many countries combined policy, regulation and the operation of the telephony provider in one government department. With market liberalisation and privatisation, these functions are placed in separate organisations.

The powers and purpose of the regulator are determined by the policy framework. For example, the approach to competition and price regulation depends partly on the balance between competition law and regulation [1]. The EU applies the "three criteria test", all of which have to apply for a market to require *ex-ante* regulation [2]:

Table 1.1: The EU's Three Criteria Test

	Test	Comment
1	The presence of high and non-transitory barriers to entry	These could be structural (eg scale) or legal/regulatory (eg spectrum rights)
2	A market structure that does not tend towards effective competition within the relevant time horizon	Technological developments or convergence may lead to competitive constraints on operators active in distinct product markets
3	The application of competition law alone would not adequately address the market failure(s) concerned	Competition law is unlikely to be sufficient where the compliance requirements of an intervention to redress a market failure are extensive or where frequent and/or timely intervention is indispensable

Photo: T1.1

The EU is concerned that newly emerging markets should not be subject to inappropriate obligations, even if there is a first mover advantage due to their novelty because it is difficult to apply the three criteria and its desire to promote innovation. Meeting the three-criteria test does not automatically mean that regulation is warranted. In addition, one or more operators must be found to have [significant market power](#). Using these three criteria, the EU finds the following markets may need *ex-ante* regulation [2]:

Table 1.2: EU Markets Suitable for Ex-Ante Regulation

Market	Service	Comments
1	Retail access to PSTN	Retail line rentals (but not calls) unless Wholesale Line Rental or infrastructure (cable) competition established.
2	PSTN originating access	To support call/carrier selection
3	PSTN terminating access	To support call/carrier selection and any-any connectivity (between fixed mobile users)
4	Wholesale network infrastructure access	Mainly full or partially unbundled lines
5	Wholesale broadband access	Bitstream access which is downstream from market 4 which can provide market 5 access when combined with other elements.
6	Wholesale leased lines	For tails only as the trunk segment is deemed competitive in most Member States
7	Voice call termination on mobile networks	Includes SMS

Photo: markets st ex ante regulation EU

Note that only the first market is regulated at the retail level. A downstream market should only be subject to direct regulation if competition on that market still exhibits SMP in the presence of wholesale regulation on the related upstream market(s).

Regulators can apply regulatory remedies to other markets in the EU, but they have to satisfy the Commission that the three criteria test has been met.

A key role of policy is to set the goals to be supported by regulation. In all countries, regardless of their level of development, policy goals that drive regulation include:[3]

- **Universal affordable access** to communications: this has traditionally been about extending telephony services. Best practice is discussed in [Module 4](#). Traditionally, it has been supported by cross-subsidies from usage to access (or handsets in the case of mobiles). This mechanism is inconsistent with competition (next point). However, politically mandated social policies such as geographically uniform tariffs still exist and can constrain the regulator's attempt to set cost-based tariffs in pursuit of [efficiency objectives](#).
- **Competition**: until recently, the general policy has been facilities-based competition (also referred to as platform-based competition) which occurs between vertically-integrated players such as the telecommunications incumbent and a cable or mobile operator. Where policy makers have decided that fibre broadband networks are a [natural monopoly](#), the policy focus has shifted to service-based competition rather than infrastructure based competition [4]. This seems to be the case for some developed countries building fibre customer access networks. Natural monopoly leads to [interconnection](#), [unbundling](#) and [infrastructure-sharing](#) policies.
- **Efficiency**: Competition increases [efficiency](#) and drives prices towards costs. The cross-subsidies from call revenues that promoted universal access with monopoly are not possible when there is competition for call revenue. This means that line rentals and local call prices have to go up so that long-distance prices can move towards cost. Policy may dictate how fast this should occur, often through [price caps](#) and such policy should be reflected in both access and retail price regulation. In developed countries the cross-subsidy from fixed to mobile users is being eliminated with rapid reductions in [mobile termination rates](#).
- **Broadband**: Ensuring widespread adoption of broadband is a key policy objective for most countries now. Since mobile broadband will be the main delivery platform in developing countries, a key policy task is the allocation of [wireless spectrum](#). In markets aiming to upgrade copper networks with optical fibre, public investment is stepping-in where private investment lags.
- **Innovation**: a healthy ICT sector will see new services and applications constantly brought to market. Sometimes these may undermine existing service revenues. Examples of such game-changing innovation are [VoIP](#) and [Smartphone Apps](#).
- **Private sector investment** in the ICT sector: For this to occur, both policy and regulation must be clear and applied predictably and consistently. An unsolved [investment issue](#) is how to set the policy rules for public investment.

The importance attached to different policy goals depends upon the circumstances and economic and social objectives of any country. As the table below shows [6], the circumstances of countries can vary in several respects and this implies different policy objectives and issues.

Table 1.3: Differences between regions

	High Income Economies	Developing Economies
GDP per capita [1]	Over US\$12,000	Under US\$4,000
Fixed phone, 2010 [2]	40.9 per 100 inhabitants	12.1 per 100
Mobile, 2010 [2]	116.1 per 100	67.6 per 100
Fixed broadband [3]	24.6 per 100	4.4 per 100
Mobile broadband	Focus on rural areas	Main broadband platform
Household internet access 2010 [3]	65.6%	16.8%
Demand factors	Mass demand	Affordability issues
Investment factors	Can afford some duplication and experimentation	Access to capital poor
Telephony focus	Fixed network with some mobile substitution	Mobiles

1. <http://data.worldbank.org/about/country-classifications>
2. http://www.itu.int/ITU-D/ict/statistics/at_glance/KeyTelecom.html
3. <http://www.itu.int/ITU-D/ict/material/FactsFigures2010.pdf>

Photo: Differences

The policy focus in developed countries was originally on introducing competition in the call market, leading to the regulatory focus on switched interconnection [7]. With the advent of DSL technologies allowing broadband over the traditional copper PSTN (Public Switched Telephone Network) the business model shifted to competition for customer access and the regulatory focus shifted to [local loop sharing](#) and [line unbundling](#). Currently, the main pre-occupation of policy in developed countries is deploying broadband networks so the regulatory focus has shifted again to [bitstream access](#) and [infrastructure sharing](#).

As noted in [section 1.1](#) and as shown in Table 1.3 above, many developing countries have almost by-passed the building of fixed copper networks with mobile networks. They are so much cheaper to build that even smaller developing countries have been able to support mobile infrastructure competition.

ENDNOTES

[1] With the exception of provisions for [mergers and acquisitions](#), competition laws are generally ex-post. They give the competition authority (or the courts) the powers to respond to [anti-competitive behaviour](#) after it has occurred. However, regulation tends to be ex-ante because regulators are generally given authority to impose rules and intervene prior to certain actions involving industry participants (e.g., approval of tariffs or interconnection rates; change of control or mergers). Competition policy and regulation are not mutually exclusive. Many countries use a mix of both. However, care is required to ensure that sector regulation and anti-trust laws are developed and applied consistently.

[2] Commission Recommendation of 17 December 2007 on relevant product and service markets within the electronic communications sector susceptible to ex ante regulation

[3] Policy issues impacting regulation that predominantly affect developed countries include [convergence](#) and [net neutrality](#).

[4] An extreme case is the Australian Government's decision in 2009 to form a public company (NBN Co.) to build a national fibre-to-the-home broadband network. To ensure its viability, it is forcing the incumbent to migrate all customers from its copper network as the new network is rolled-out and to also to stop using its HFC cable network (except for the delivery of PayTV). http://www.dbcde.gov.au/broadband/national_broadband_network

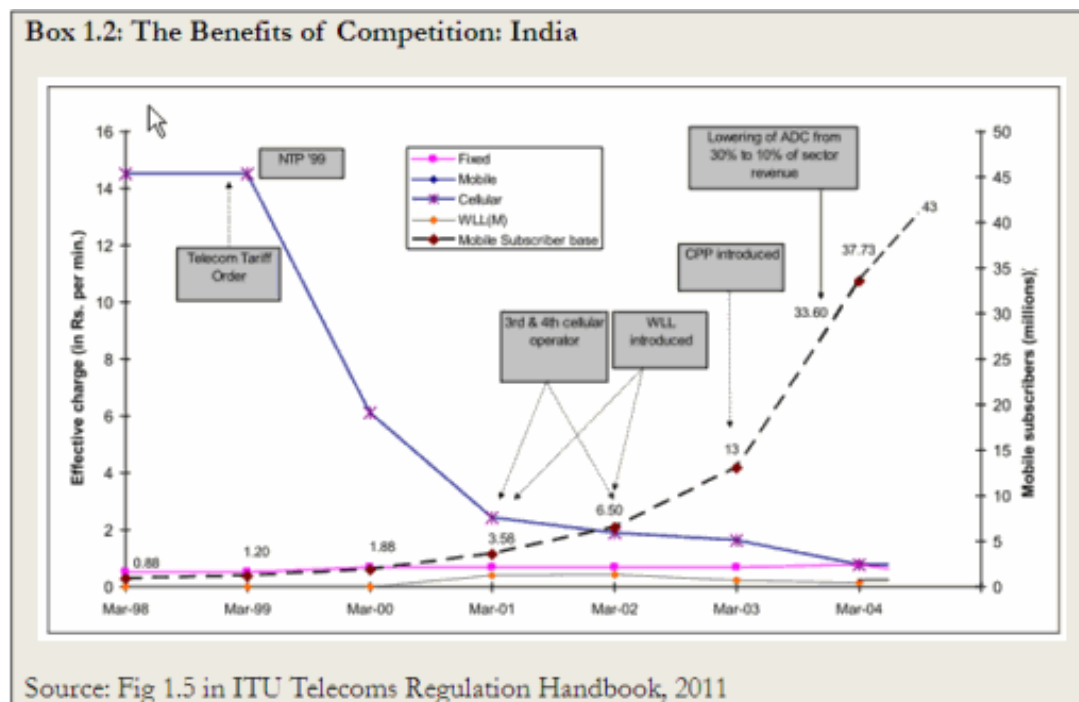
[5] Wireless broadband requires wide spectrum bands to be able to provide broadband access at adequate quality levels, which is primarily an issue of download speeds. National broadband plans tend to focus, in many cases, on policies aimed at reassigning frequency bands (in particular, allocating the [digital dividend](#) spectrum resulting from the digitalization of broadcasting) or searching for [white spaces](#) and assigning them to the wireless mobile communications sector.

[6] The World Bank classifies all low- and middle-income countries as developing. Economies are divided according to 2009 GNI per capita, calculated using the [World Bank Atlas method](#). The groups are: low income, \$995 or less; lower middle income, \$996 - \$3,945; upper middle income, \$3,946 - \$12,195; and high income, \$12,196 or more. The ITU's list of developing countries and lists of countries by regions is at <http://www.itu.int/ITU-D/ict/definitions/regions/index.html>

[7] The regulatory framework in the European Union has evolved with changing priorities; most recently in 2009. The [2009 framework](#) continues the shift to less sector-specific and more ex post regulation in the European Union. Significantly, the EU regulatory package has been forcefully linked to broader policy objectives concerning inclusiveness, innovation, job creation, growth, energy and environmental issues.

1.3 Regulatory Issues

As indicated in [Section 1.2](#), regulation is an instrument of policy. Regulation takes second place to competition [1]. Competition is a desirable goal not for its own sake, but because of the benefits from competition. These benefits derive from the pressure competition places on firms to be efficient, innovative and customer focused in order to thrive and survive. They include lower prices, higher productivity, more service choices, and greater connectivity. Competition is held to be the most efficient mechanism available for organizing, operating, and disciplining economic markets [2].



Competitive markets distribute resources efficiently and fairly without any need for a single centralized controlling authority. Competition maximizes benefits to society at large by increasing:

- **Allocative efficiency** – which refers to the optimal allocation of resources to meet consumer demand.
- **Productive efficiency** - which is achieved when resources are used to produce output at lowest cost
- **Dynamic efficiency** – which refers to changes in efficiency over time. It is generally regarded as being promoted where producers have incentives to invest and innovate to meet future consumer demand.

Regulation acts as a surrogate for competition where competitive forces are weak (eg in forcing monopolies to reduce prices and increase output) or where there are significant [externalities](#). Where regulation is a proxy for competition, the notions of efficiency above are used as a guide to regulatory decisions; subject to policy.

Note that there may be a trade-off between the long-term dynamic efficiency objective (investment) and the short-term allocative efficiency objective (lower prices). Regulators are faced with a complex balancing exercise. Individual regulatory decisions need to balance:

- The long term objective of ongoing, sustainable competition, and
- The resolution of immediate short-term concerns, while
- Complying with the legislative provisions under which regulators operate.

Using regulation to make markets more competitive must be done very carefully. The [impact of the regulator on competition](#) may not be what was intended. Regulators may be tempted to micromanage the market to ensure that competition (or a particular form of competition) takes place. Alternatively, they may decide prematurely that the market is fully competitive. Neither of these paths is likely to result in sustainable competition.

Regulators have to be wary of rent-seeking [3] and aim for principled, consistent and predictable decision-making. A good example of best-practice is Ofcom's approach to regulation which emphasises regulatory forbearance in its operations; relying on markets where possible and operating with a bias against intervention [4]. Where intervention is required, Ofcom aims to intervene firmly and promptly, using the least intrusive regulatory mechanisms available. It has seven "[regulatory principles](#)".

ENDNOTES

[1] There are different degrees or forms of competition. See [Forms of Competition](#).

[2] See also [Jamaica: The Benefits of Mobile Competition](#).

[3] Rent seeking is on-market behaviour to seek competitive advantage. For example, lobbying for protection or monopoly rights would be rent-seeking.

[4] Regulatory forbearance is about regulating only where it is needed, and withdrawing regulation in those parts of the market where it is no longer necessary. In other words, the concept of regulatory forbearance rests on the goal of a gradual removal of ex ante regulation and an accompanying increase in the use of general ex post competition regulation. It is particularly important to be cautious about regulating rapidly innovating sectors; eg [M-Pesa](#). See also [Regulatory Forbearance in Canada](#).

1.4 Key Developments in the ICT Sector

Even in developed countries, many regulatory decisions remain based on three assumptions about the sector that no longer reflect reality. Some regulators appear to assume that,

- telecommunications mainly concerns voice calls.
- telecommunications networks remain natural monopolies.
- the firm that owns the network also provides the service - VoIP demonstrates that the basic premise of traditional voice telephony – the network and voice services must be owned and operated by the same firm – is no longer relevant.

Broadband technology in particular has challenged all three assumptions.

Both policy and regulation have to adapt to, but not over-react to, changes in the ICT sector. The nature and pace of change create challenges for both regulators and regulated firms. This section provides an overview of key developments in the ICT sector, across four categories:

- [Technological Changes](#)
- [The Emergence of New Services](#)
- [Changes in Market Structure](#)
- [Investment Issues in the Sector](#)

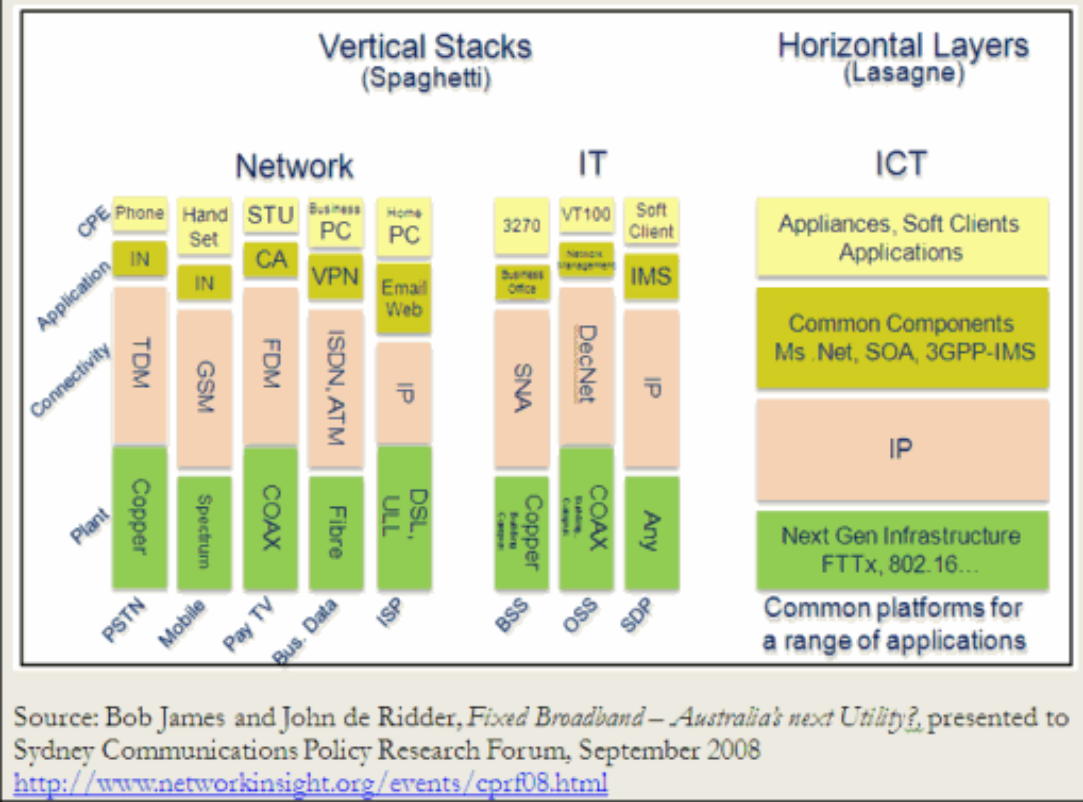
1.4.1 Technological Change

Digital technologies are changing the ways in which the majority of people live, work, play and interact with each other. We can see this reflected in the language we use. Our vocabulary is evolving as existing words assume new meanings – app, burn, text – or appear in new combinations, such as smartphone, cyber-crime, file sharing. Some vocabulary is entirely new: the words blog, podcast and googling have become commonplace. The range of technology acronyms in everyday use continues to expand – P2P, SMS, MP3 – and adds to the sense that what we are witnessing is the dawn of a new information age, in which ICTs become part and parcel of daily life.

The most fundamental shift behind all these changes is the transition to all-digital networks which has profound implications for competition and regulation. Networks used to be built vertically around specific applications (eg voice or PayTV) but digitisation 'de-layers' networks

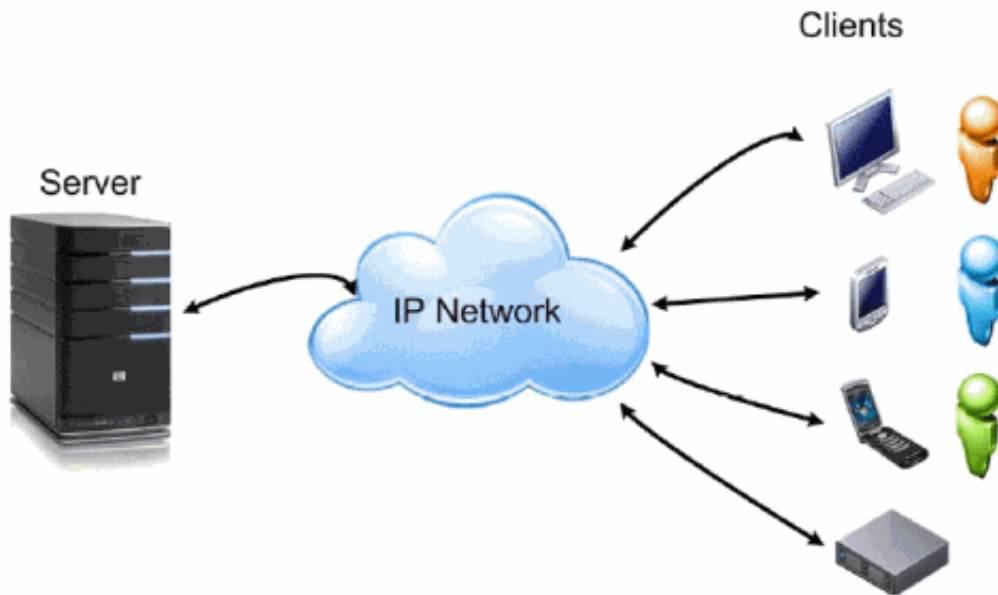
(Box 1.3) so that content or applications are no longer network specific. A byte is a byte and Next Generation Networks are layered to serve all applications.

Box 1.3: Delaying of the ICT Industry



The Next Generation Network operates seamlessly across a variety of infrastructure types. Figure 1.1 shows different digitised access platforms can communicate with each other instead of being limited to service-specific platform. Various services are delivered from a server. This means you can access the internet on your TV, listen to radio on your PC, and watch video on your mobile device.

Figure 1.1: NGNs combine all digital networks



1.4.2 Emergence of New Services

The combination of broadband (wired or wireless), the digitalization of media content, and the falling costs of producing digital content herald an age of abundance. New content producers have a means of distributing their creations instantly and globally. Content can be customized to the personal tastes of an individual rather than be defined for a mass audience.

High speed broadband technologies are underpinning the development of "always-on" and readily accessible applications. The always-on nature of connectivity-based applications has provided the catalyst for developments in e-health, e-education and teleworking.

In the legacy access environment, it is a simple task to identify the carriage provider and the party to whom the carriage service is provided. In the residential market, a carriage service is provided to an individual and any others at the residence for their use. All services are provided by an access provider, which charges for the telecommunications services acquired.

In the next generation access environment, the supply chain is fragmented. From a user perspective, many elements in the supply chain will not be known or will be beyond the user's control. For example, a user may use a smartphone to make a VoIP call via a Wifi network while at a cafe. The call uses the cafe's Wifi infrastructure and internet service to authenticate the user's service on a server that could be located anywhere. The call then can be carried via a number of packet networks before reaching its destination, which could be on a legacy network. Such a call can use private, carrier, internet and legacy networks for carriage, and be initiated by a service anywhere in the world.

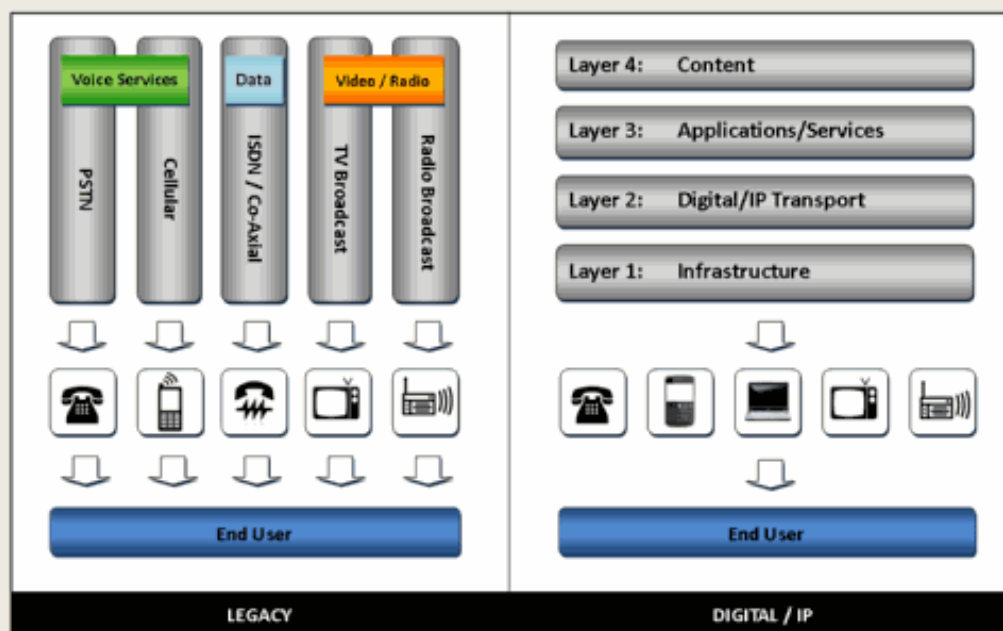
Some telecommunication regulations assume that the provision of a service can be related to a specific carriage service or provider. Such assumptions may no longer be valid in a next generation access environment where the relationship between services and carriage may not be fixed or known. Next generation networks effectively remove legacy carriage technology barriers to provide a broad foundation for the development of applications and services in a converging industry.

1.4.3 Changes in Market Structure

Convergence is blurring the boundaries between sectors. The historical distinctions between radio communications, telecommunications, broadcasting and the internet are blurring. Convergence is characterised by five key causes of change. These are [1]:

A. *Technological developments.* Digitalisation is separating services from transport layers. Previously distinct media, such as voice telephony, broadcasting and internet applications, are converging into common interfaces on single devices (Figure 1.2).

Figure 1.2: Convergence in networks and service layers



Source: ACMA *Broken Concepts*, August 2011 <http://engage.acma.gov.au/wp->

B. *Market developments and associated changes in industry structure.* Liberalisation of telecommunications markets has resulted in multiple competing networks offering electronic services. Broadcasting, media, information technology and telecommunications markets are merging into a broad communications market.

C. *Changing consumer and/or citizen engagement.* Data delivery is increasingly ubiquitous and consumers are increasingly substituting data-based communications (for example, email, short message service (SMS) and social networking applications) for voice services. Content production is also shifting away from industry as users generate their own content and share it via the internet. Private and public service delivery is also shifting online. These developments are changing the way citizens interact with each other, procure services and participate in the public sphere.

D. *Globalisation of markets and regulation.* Extended supply chains and the global reach of the internet is challenging regulation designed for local and national markets.

E. *National digital communications strategies.* Direct public sector investment in communications infrastructure is reshaping competition dynamics and presenting other public policy challenges (such as the delivery of consumer safeguards via industry obligations and the migration of telecommunications to IP delivery).

Several jurisdictions have integrated their media and communications laws into a converged legislative framework—Malaysia; the European Union (EU) and its member states of the United Kingdom (UK), Finland, Sweden and Italy; and South Africa. Korea, Japan and Taiwan are in the process of legislative change and have made some steps towards converging their laws [2].

A common feature of converged legislative frameworks in the EU, Malaysia and Korea is the use of a regulatory model that is structured on the network layers (Figure 1.2 above) of next-generation networks or IP-based technologies, rather than on the vertical industry structures of telecommunications, broadcasting and IT. This is described as a technology-neutral approach, which is based on the functions of the different network layers of next-generation networks.

Regulators are realizing that their existing regulatory frameworks may impede the ability of operators to make triple or quadruple play offerings to consumers or use low-cost Voice over Internet Protocol (VoIP).

Box 1.4: Mobile Money

Banking and telecommunications are converging around mobile banking with smartphones and “near field communications” (NFC or “wave and pay” allows transactions between two devices in close proximity).

M-PESA is a famous early example of mobile banking where regulatory forbearance by a non-telecoms regulator led to satisfactory outcomes. M-PESA is a small-value electronic payment and store of value system accessible from ordinary mobile phones. Since its introduction by mobile phone operator Safaricom in Kenya in March 2007: it has been adopted by 13 million customers (over half of Kenya’s adult population) and processes more transactions than Western Union does globally.

The Central Bank of Kenya was concerned about the impact on existing deposit-taking institutions. But, it was even more concerned by the lack of access to financial services so it allowed the new payment mechanism to proceed under its watch.

Access to financial services is an issue not confined to emerging markets. In 2011, the European Commission reported that up to 30 million consumers aged 18 or over do not have access to basic banking and payment facilities. However, the EU is concerned that standards being developed by the Electronic Payment Council may exclude new entrants or those not backed by major banks.

Source: Mas, Ignacio, and Dan Radcliff. 2010. Mobile Payments Go Viral: M-PESA in Kenya, in *Yes Africa Can: Success Stories from a Dynamic Continent*, World Bank, 2010.

<http://www.microfinancegateway.org/p/site/m/template.rc/1.9.43376/>

The emergence of new services such as (for instance) IPTV with guaranteed quality requires specific applications of traffic management which in turn create incentives for network operators and ISPs to vertically integrate into content, applications and services markets. But there may then be an incentive for operators/ISPs to in turn discriminate against competitor’s equivalent services. This would be a violation of [net neutrality](#).

ENDNOTES

[1] ACMA, Broken Concepts: The Australian communications legislative landscape, August

[2] ACMA, Converged Legislative Frameworks – International Approaches, July 2011

1.4.4 Investment Issues in the Sector

In the past, telecommunications operators have been viewed as stable, monopolistic utilities. The main challenge for regulators had been to prevent excessively high retail **pricing** (section 7) by incumbent operators.

With increasing competition from new providers and new services, the telecommunications sector is becoming more volatile. Average revenues per line from traditional services are declining under pressure from competing providers and modes of delivery. In particular, the emerging [de-layered structure](#) of the industry means that ‘over-the-top’ applications (like Skype) which have no intermediation by the carriage provider take revenues directly from the end customer. This loss of revenues is happening to both fixed operators and, with smartphones, also mobile network providers.

At the same time, network providers are expected to invest heavily in next generation fixed and wireless broadband networks. This may not happen fast enough to suit policy makers [1] with regulatory implications for open access, competition and price regulation.

A common reason for market invention is [market failure](#) due to ‘positive externalities’. That is, investment in broadband is socially beneficial (public and private benefits exceed total costs) but private investment is not profitable (private costs exceed private benefits). This is most likely in rural areas where costs are high and demand is sparse, but may also occur in urban areas.

- The approved remedy for this kind of market failure is to provide a capital grant or subsidy to the private operator to make the investment profitable. This could be done through a public tender process and conditions could be attached to make the operator provide [open access](#).
- Another remedy is to provide a regulatory ‘access holiday’. This is what was done for Verizon and AT&T [2] and sought by Deutsche Telekom [3]
- A third option which has been used is direct public investment. This can range from local municipal networks to national networks like the Australian National Broadband Network [4].

Box 1.5: Public Investment

Public investment is popular with users but disliked by incumbents and regulators who want to prevent 'unfair' competition.

To justify a public investment, the European Commission requires detailed local mapping of availability, need, and rollout; an open tender process; acceptance of the most economically advantageous offer (which need not be the lowest bid); that the tenders be technologically neutral; that, where possible, they use existing infrastructure (except where the recalcitrance of the local monopolist is part of the problem); that the successful bidder offer its network for wholesale services to other providers at rates that are benchmarked against wholesale rates in competitive areas, and; that the tenders or laws pursuant to which a tender is made include claw back provisions allowing the state to seek restitution of profits found to have been excessive following such price benchmarking.

Another form of [market failure](#) is due to 'natural monopoly'. That is, duplication of fixed broadband access networks is uneconomic. That is of special concern to countries where investment resources are scarce but could also be of concern to developed countries if it meant that no duplicated network achieves the scale it needs to be viable.

- The approved remedy is **open access**; which is what Australia's national broadband network will provide. It has persuaded incumbents to close their own fixed broadband networks and to move their customers to the new network in what is effectively a switch from infrastructure-based competition to service-based competition.
- A single broadband access network with open access can be seen as just another vital utility network. The days when networks were built around applications (i.e. telephony and television) are over. With [technological change](#), control of the access network does not confer control of the customer or service.

Significant Market Power (SMP) could lead to an operator restricting output to increase profits. Even if there is latent demand for faster broadband, the operator may prefer to sell existing data services rather than provide broadband services where it cannot differentiate so easily between business and residential customers.

- One remedy is to force existing operators to provide [open access](#) to their networks (i.e. provide wholesale services).

Uncertainty over demand could lead to an operator not deploying next-generation broadband. This could be a market failure if there was enough underlying demand, but operators were not able to identify it.

- This potential market failure can be overcome by demand-side stimulation interventions.

Regulatory uncertainty could lead to operators not investing in new infrastructure as they are unclear on how regulation may impact their investment in future.

END NOTES

[1] Analysys-Mason report for the UK Broadband Stakeholders Group. The report also discusses social drivers and semi-commercial public sector expansion (often by a utility).

[2] The FCC decided to forbear from unbundling and price regulation of FTTH in August 2003, extended this to FTTN in October 2004 and also DSL in September 2005.

[3] In February 2006, the German Government exempted Deutsche Telekom's VDSL (FTTN) network from providing access, without reference to either its own regulator (the 'Bundesnetzagentur') or the European Commission. The European Court of Justice confirmed the Commission's position that national legislation may not exempt next-generation ('new') electronic communication markets from regulation or limit the discretionary powers of the national regulator in its exclusive right to assess whether markets should be regulated or not under EU rules.

[4] NBN Co. was set-up as public company offering only wholesale broadband fibre access (FFTH) services after a tender process for FTTN was aborted. http://www.dbcde.gov.au/broadband/national_broadband_network

1.5 Evolution of Competition

Regulators have to understand how competition is shaped by regulation and technology and the appropriate responses. This section explores:

- [Impact of the regulator on competition](#)
- [Impact of technology on competition](#)
- [Level of competition globally](#)

1.5.1 Impact of the Regulator on Competition

Ideally, the actions of the regulator should lead to the same outcomes we would expect in a competitive market. Inevitably, the market will be different as a result of regulation. Even with the best intentions, outcomes may be poor because regulators do not have perfect foresight and knowledge. Sometimes, the costs of regulatory action are higher than taking no action. With fast-moving technology, inaction may be less costly than regulation.

The concept of the ladder of investment [1] influenced many regulators who believed they could help new entrants towards 'facilities-based' competition. The steps towards this goal that new entrants in developed markets have evolved through are:

- Retail arbitrage (resale)
- Switched reseller
- Unbundled local loop
- Facility based (fibre)

In developing markets, the addressable market for the above options is limited because the copper network in developing countries is less extensive. However, mobile technology side steps the ladder because it allows infrastructure competition to occur immediately. Below, we consider all these phases and the role of policy and the regulator [2].

The first rung of the ladder of investment is mandated [resale](#). This requires no infrastructure investment by the new entrant but regulated profit margins are very small. Where the regulator is required to arbitrate a wholesale price, it is likely to be on the basis of the **retail-minus** method.

Figure 1.3: Retail Arbitrage Model (Resale)

		Access	Voice	Data	Mobiles
CBD	Corporate				
	Commercial				
Metro	Commercial	Target Market			
	Residential				
Rural	Commercial				
	Residential				

Bulk discounts are used to sell into commercial and residential markets. Above, customers in the City Business District (CBD) are not in the addressable (target box) market because they already get the large discounts. The new entrant requires no infrastructure. Billing services can be purchased so the cost base is variable. There are no sunk costs; except in building brand awareness. The model is dependent on the arbitrage window between what the new entrant pays to the incumbent and what it receives from its customers. The new entrant carries the credit risk if end-customers to not pay [3].

Regulators are sympathetic to resale because it can help new entrants build a customer base ahead of investing in their own infrastructure. As the new entrant acquires customers, it can move up the ladder by acquiring a voice switch and leasing long-distance transmission. This lead to the model depicted in Figure 1.4.

Figure 1.4: Switched Reseller Model

		Access	Voice	Data	Mobiles
CBD	Corporate	Target Market			
	Commercial				
Metro	Commercial				
	Residential				
Rural	Commercial				
	Residential				

In this model (Figure 1.4), the entrant provides long-distance services by inviting its customers to preselect it for long-distance calls and pays the incumbent for originating and terminating interconnection at each end of its transmission network. Its profit margins improve compared with resale. The margins between retail prices and regulated, cost-based interconnection charges are much larger than regulated resale margins. However, there are now significant fixed costs, so scale becomes important.

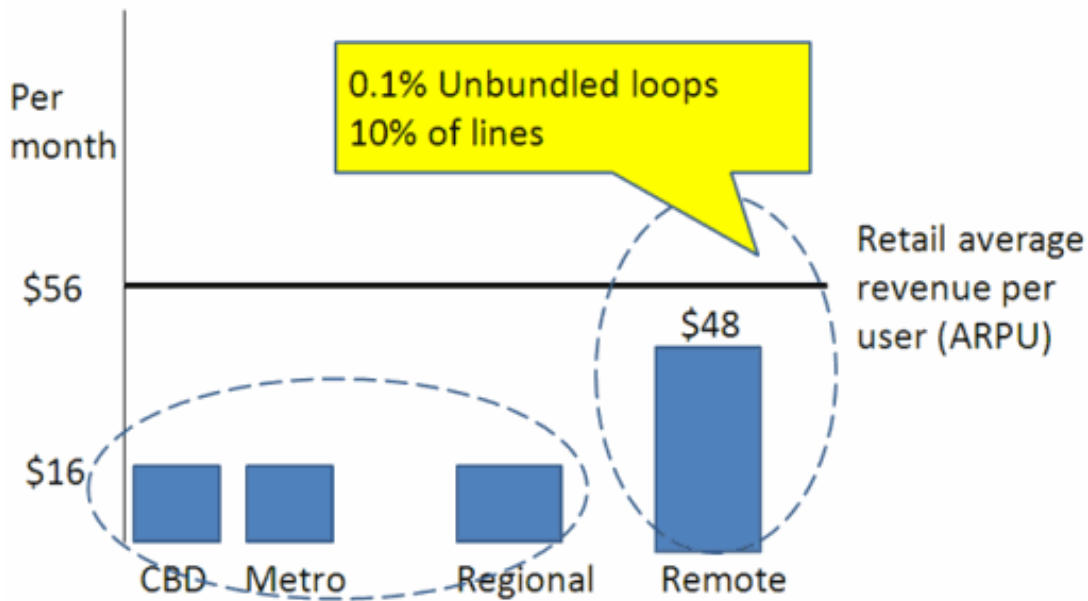
With the model in Figure 1.4, the entrant still has to resell line rental and local calls to provide the customer with one bill for basic services. The next step is to acquire access more cheaply than resale.

Figure 1.5: Unbundled Local Loop Model

		Access	Voice	Data	Mobiles
CBD	Corporate	Target Market			
	Commercial				
Metro	Commercial				
	Residential				
Rural	Commercial				
	Residential				

The [unbundled local loop](#) model shown in Figure 1.5 allows the entrant to provide differentiated broadband service as well as all other services provided over the copper loop (including terminating access fees). If the regulated cost of unbundled local loop is geographically de-averaged, it may be too expensive to provide services in rural areas, which can continue to be served with the previous models [4]. Apart from any higher cost of the loop in rural areas, there is a scale issue because there may not be enough customers to justify investing in DSLAMs [5] and transmission facilities.

Figure 1.6: Geographically De-averaged Unbundled Loop – Australia 2011



Source: ACCC *Final Access Determination*, July 2011

European regulators have been keen on unbundling the local loop and some think the US should have followed the same path instead of relying on competition from cable networks [6]. However, new entrants have not stepped off the ladder to build their own fixed customer access networks dashing the hopes of regulators.

Also, the focus of regulators has shifted from providing access to existing fixed copper networks to stimulating investment in fibre broadband networks.

Figure 1.7: Facility Based Model (Fibre)

		Access	Voice	Data	Mobiles
CBD	Corporate	Target Market			
	Commercial				
Metro	Commercial				
	Residential				
Rural	Commercial				
	Residential				

The communications market in City Business Districts is concentrated. So it is economical to build fibre rings to provide fibre access to the high value corporate customers passed by the fibre. The regulator's main task is to facilitate [infrastructure-sharing](#) to allow the entrant to lay its fibre in the incumbent's ducts.

Again, this model can co-exist with the use of one or more of the previous models in other regions. The new entrant chooses the models that will increase its markets and margins most efficiently.

All the above applies in the context of fixed, mainly copper, networks. Mobiles networks have proved a disruptive technology and a blessing for developing countries.

Figure 1.8: Mobile Model

		Access	Voice	Data	Mobiles
CBD	Corporate	Target Market			
	Commercial				
Metro	Commercial	Target Market			
	Residential				
Rural	Commercial				
	Residential				

Mobiles provide full-blooded infrastructure competition between mobile operators as well as against incumbent fixed networks. All services including broadband can be provided by mobile networks; except that major companies (and others) will also use fibre for broadband where it is available.

Mobiles are generally held to be competitive where three or more operators exist, but the regulator will have a number of issues to deal with including making spectrum available, lowering **termination rates** (6.4), adjudicating the terms of **mobile roaming** (6.5) and **network sharing** (6.6).

Just as the fixed network cross-subsidy from calls to access was eroded by call competition, there is increasing pressure on mobile operators as regulators force-down mobile termination rates, mobile call selection (e.g. Jordan) and as voice apps arrive on mobile phones.

ENDNOTES

[1] Martin Cave, Encouraging infrastructure competition via the ladder of investment, in Telecommunications Policy, Vol.30, Issues 3-4, April/May 2006

[2] A higher level view of the evolution of competition is given in [section 3.1.1](#).

[3] Or, if the new entrant fails (as with OneTel in Australia), the incumbent bears the loss. This is why incumbents impose deposit requirements and run credit checks on new wholesale customers.

- [4] In Australia, while fully unbundled local loop pricing was de-averaged geographically, partially unbundled [line-sharing](#) was not. So new entrants could acquire that part of the copper line that allowed broadband services to be provided and resell access and calls.
- [5] Digital subscriber line access multiplexer. A device, located at the central office or telephone exchange that separates and routes the voice-frequency signals and data traffic on a copper line.
- [6] *“Our most surprising and significant finding is that “open access” policies—unbundling, bitstream access, collocation requirements, wholesaling, and/or functional separation—are almost universally understood as having played a core role in the first generation transition to broadband in most of the high performing countries.....the FCC decided to abandon this mode of regulation for broadband in a series of decisions beginning in 2001 and 2002. Open access has been largely treated as a closed issue in U.S. policy debates ever since”*, p13 Next Generation Connectivity: A review of broadband Internet transitions and policy from around the world, Berkman Centre for Internet and Society, February 2010

1.5.2 Impact of Technology on Competition

In the USA, cable companies with networks designed to deliver television found they could use their networks to deliver broadband services including voice; encroaching on the traditional telephone business. At the same time, copper networks designed for voice found they could also be used to deliver broadband. With competition between these networks, the US decided it could be more relaxed about regulating telephone companies [1]. In fact, it ditched its mandatory unbundling requirements to encourage investment in fibre networks.

During the first broadband transition, a major assumption underlying the reliance on facilities-based competition was that cable and telephone infrastructures already in place needed relatively low and largely symmetric cost upgrades to provide Internet services. This meant that, at a minimum, there would be two facilities whose incremental upgrade costs were sufficiently low to be able to compete head-to-head in retail broadband markets. In addition, there were some hopes that the same would be true of power lines and wireless systems. Together these meant that technological convergence could underwrite competitive markets among players, each of whom invested in—and owned—their own complete facilities.

Box 1.5: Fibre access as capital works projects

Up to 70 per cent of the costs of developing broadband infrastructure in the fixed-line network are excavation costs. These costs may be reduced significantly if the various infrastructure providers become more open to collaboration and allowing third-party access to their own systems.

Source: Germany, Federal Ministry of Economics and Technology, The Federal Government’s Broadband Strategy (February, 2009)
<http://www.bmwi.de/English/Navigation/Service/publications,did=294718.html>

Transposing the experience of open access in the first generation to the next generation is taking a wide range of alternative forms. The shared core understanding is that the transition to next generation infrastructures re-emphasizes the high upfront costs involved in, or natural monopoly, characteristics of, telecommunications networks, and requires some form of shared infrastructure if competition is to be maintained in the teeth of such economies of scale.

Mobile technology has also evolved to the point where it can also offer broadband. Australia was the first country to launch a nation-wide 3G mobile phone service and now claims [2] to offer 4G mobile telephony (Table 1.4).

Table 1.4: Telstra's Path to 4G in Australia

Service	Year	Features	Down*	Up*	Population Coverage
1G	1987	Analogue for voice	n/a	n/a	96%
2G	1993	First digital phone, <u>sms</u>	n/a	n/a	96%
2.5G (GPRS)	2001	Basic data, WAP	30kbps-40kbps	10kbps	96%
3G (HSDPA Phase)	2006	Next G [®] , faster downlink, first video	550kbps-1.5Mbps	60kbps-330kbps	98%
3G (HSPA Phase)	2007	Faster uplink data	550kbps-3Mbps	300kbps-1Mbps	99%
3.5G (HSPA+ Phase)	2008	Smart-phones, apps, games, social media.	550kbps-8Mbps	300kbps-3Mbps	93%
3.5G (HSPA+ Dual Channel)	2009	The above at faster speeds	1.1Mbps-20Mbps	300kbps-3Mbps	60%
4G	2011	High def video conferencing, faster up & download speeds, lower latency	2Mbps-40Mbps	1Mbps-10Mbps	40%

*Typical customer speed ranges that can be achieved with appropriately rated devices. Actual speeds vary due to factors such as location, distance from the base station, local terrain, user numbers, hardware & software configuration and download source/upload destination.

Source: Telstra

In developed markets, there is debate about the extent to which fixed and mobile broadband are complements or substitutes [3].

Mixing mobiles and fixed networks, Wi-Fi is also becoming important. Wi-Fi is in virtually all portable consumer devices and customers are actively seeking Wi-Fi hot spots to reduce data costs and improve their wireless broadband experience. The vast majority of tablets sold to date are Wi-Fi only devices. Wireless broadband is increasingly viewed as a portable and nomadic service for the consumption of media rich content and video.

Also, major wireless carriers worldwide are deploying Wi-Fi as means of offloading 3G/4G traffic on to the fixed network thereby reducing mobile network build costs, and improving capacity and coverage. Since Wi-Fi spectrum is free and there are no device subsidies, extensive Wi-Fi coverage can be built at a substantially lower cost relative to a traditional wireless networks and still provide customers with an excellent broadband wireless experience

Across all these network types, the biggest development which comes out of digitisation is the emergence of apps (applications). Some of these apps are especially disruptive because they undermine the business models of the network providers. For example, apps like Skype provide cheap voice. They can effectively kill the case for implementing [Carrier Selection](#) on fixed networks as the mobile market is far larger and smartphone penetration is already above fixed line penetration [4].

END NOTES

[1] For a comparison of US broadband policy with other countries, see Berkman Centre's study for the FCC: Harvard, Next Generation Connectivity: A review of broadband Internet transitions and policy from around the world, February 2010
<http://cyber.law.harvard.edu/pubrelease/broadband/>

[2] Although they do not deliver 100Mbps, the ITU's revised guidelines of December 2010 allows commercially deployed LTE (Verizon), WiMax (Sprint) and HSPA+ (T-Mobile) to call their networks "4G." http://www.itu.int/net/pressoffice/press_releases/2010/48.aspx

[3] In Australia, Telstra is prohibited from promoting mobile broadband as an alternative to the Government's fixed national broadband network, the NBN, and forfeits the bounty it gets from migrating customers off its copper network if they choose mobile broadband instead of the NBN.

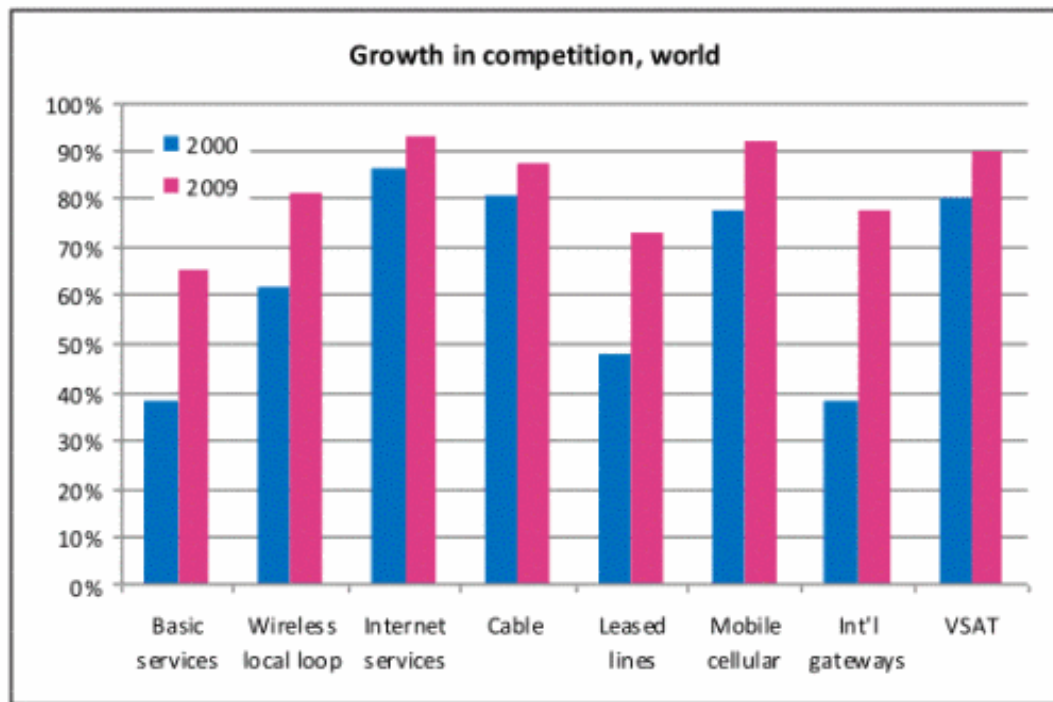
[4] Rood H. and Abdulaziz H., Carrier Selection, Dead on Arrival?, TPRC 2011 http://www.tprcweb.com/images/stories/2011%20papers/Rood_TPRC2011.pdf

1.5.3 Level of Competition Globally

Over the last decade, many countries have opened-up various telecoms markets to new entrants. According to ITU data [1], at the end of 2009,

- As shown in Figure 1.9 below, over 65 per cent of countries now have either full or partial competition in basic services (local, long distance and international services).
- Competition in mobile and internet services is extremely common – 90 per cent of countries have either partial or full competition in the mobile sector.
- The most competitive sector is internet services area with 93 per cent of countries allowing full competition in the sector.

Figure 1.9 Changes in the Level of Competition Globally



Source: ITU, cited in *Telecommunications Regulation Handbook*, 2011

Monopoly provision of local service is still prevalent in some regions; particularly in Africa and the Arab States, where 44 and 57 per cent of countries respectively have a monopoly local service provider. The data show significant competition in Europe and the Commonwealth of Independent States (CIS), where 82 per cent of countries report full or partial competition in local service. This reflects the significant impact of the European Union's competition policy and telecommunications requirements.

The picture for domestic long distance is very similar to the local service sector. Approximately 40 per cent of African countries and 52 per cent of Arab States have a monopoly in the provision of domestic long distance services. Approximately 60 per cent of countries in Asia-Pacific, 83 per cent of countries in Europe, 55 per cent in the CIS and 66 per cent of countries in the Americas, report full or partial competition in this sector.

There are different approaches to development of broadband networks in relation to preferred platforms (mobile in the case of developing countries), the scope for infrastructure competition (natural monopoly in non-urban fixed networks) and the role of public investment (where private investment does not appear).

Competition for services is also emerging from non-traditional sources with digitisation. The separation of services and platforms (or "carriage and content") has profound implications for investment in business models and investment for networks.

END NOTES

[1] The comments and Figure 1.9 in this section are drawn from the infoDev/ITU *Telecommunications Regulation Handbook*, 2011. Current data can be found at <http://www.itu.int/ITU-D/ICTEYE/Default.aspx>

2 Anti-Competitive Conduct

This section discusses anti-competitive conduct issues and remedies. Specifically, we address

- [Policy Issues](#)
- [Key Concepts](#)
- [Common Forms of Anti-Competitive Conduct](#)
- [Mergers, Acquisitions, and Joint Ventures](#)

2.1 Policy Issues

As networks migrate to digital technologies, broadcasting networks are able to carry a range of services including voice telephony. This has important consequences for sector regulators and competition policy. Co-ordination across regulatory areas (between broadcasting, data services, and telecommunications) will be important to avoid 'regulatory arbitrage' [1]. Mergers between entities in previously separate sectors may now raise competition concerns.

Many competitive conduct issues can be addressed by competition law. But, *ex-ante* regulation of conduct can be quicker and cheaper. Regulators have to avoid over-reach and be consistent and predictable. In emerging markets, [forbearance](#) is wise.

Much of a regulator's work will focus on ensuring there is no anti-competitive conduct by the incumbent or dominant operator. But, the regulator must focus on protecting the process of competition which is not always the same as protecting new entrants. The integrity of competition can be compromised by possible new entrant practices such as "slamming" [2] and misleading advertising. Such practices should be stopped.

END NOTES

[1] Sometimes arbitrage opportunities can be self-inflicted. The Australian incumbent in 1995 had to make tariffs generally available (this changed in 1997) so that pure resellers were able to access the 20-25 per cent discounts on long distance calls available to large business customers and offer residential customers better discounts than the 10 per cent they received from Telstra. Many new entrants took advantage of this arbitrage window until it was closed by Telstra price changes in 1996.

[2] "Slamming" occurs where a new entrant falsely claims a customer has chosen to switch provider.

2.2 Key Concepts

The aim of [competition policy](#) is to promote [sustainable competition](#). Before concluding that either a [merger](#) would harm competition or that [anti-competitive behavior](#) exists in a market, and then what remedies to apply, competition analysis follows the following steps:

- Define the [relevant market](#) or markets. For competition purposes, a market includes all those goods or services that are close substitutes in the eyes of buyers and all those suppliers who could produce those goods or services.
- Assess the level of competition in the market, with and without the trade practice or business acquisition in question. The level of competition in a market depends on the structure of the market, and whether it meets the conditions for [effective competition](#). Important considerations include:
 - Decide whether any firm in the market is dominant or has [significant market power](#) and the impact of the trade practice or business acquisition in question on its market power.
 - Assess whether a firm with market power has abused this position to raise prices above competitive levels or engage in [anti-competitive practices](#)
 - Assess any [barriers to entry and exit](#) and the potential for competition from new entrants, and
 - Assess the role of any [essential facilities](#).

Malaysia's Communications and Multimedia Act 1998 defines the remedies available to the Communications and Multimedia Commission to

stop or authorise [1] anticompetitive conduct:

Table 2.1: Malaysia: Remedies for Anticompetitive Conduct

Issue	Possible Action
The conduct appears to have the purpose of substantially lessening competition	Interim injunctions or fines
The conduct appears to have the effect of substantially lessening competition	Direct to the licensee to cease the conduct and to implement appropriate remedies
Application for authorization of specific conduct	Issue an authorization of the conduct, or refuse the application

Anti-competitive behaviour may also be inhibited by imposing some form of [separation](#) between the incumbent's upstream and downstream (competitive) activities.

END NOTES

[1] Section 140 of the Malaysian Communications and Multimedia Act 1998 empowers the Commission to authorize conduct that might otherwise be prohibited as anti-competitive under sections 133 or 139. The Commission may authorize such conduct if it is satisfied that the conduct is in the national interest. This will normally require the Commission to be satisfied that the national interest in the conduct outweighs any possible negative effects from reduced competition.

2.2.1 Defining the Market

Market definition focuses on the substitutability of differentiated products or services. But it must also consider other dimensions. New Zealand's competition authority, the Commerce Commission, defines markets in terms of five dimensions (see Figure 2.1):

- The goods or services supplied and purchased (the product dimension)
- The geographic area from which the goods or services are obtained, or within which the goods or services are supplied (the geographic dimension)
- The level in the production or distribution chain (the functional dimension)
- The time frame or timing within which the market operates, where relevant (the temporal dimension), and
- The different customer types within a market, where relevant (the customer dimension).

Figure 2.1: Dimensions of Market Definition



The above is similar to the [European Commission's market analysis procedure](#):

- Tentatively define the product market by determining whether two products belong in the same market.
- Tentatively define the geographic market in terms of competitors' market shares, prices, and price differentials.
- Conduct a more detailed analysis of demand-side and supply-side substitutability.
- Determine whether customers can switch to an alternate product or supplier in response to a small (5-10 per cent) increase in price; the "SSNIP" test [1]. If they can, the market definition is widened to include the alternatives.
- Determine whether other suppliers can readily switch to providing the alternate product in the relevant market [2].
- Further investigate the conditions in which competing firms operate. This may entail exploring the recent past activities of those firms, consumer behaviour and preferences (through demand elasticities and other studies), regulatory or market barriers to entry, market segmentation and the viability of efficient price discrimination.
- Use consultations with firms and consumers and on-the-spot inspections to further inform and refine the market definition analysis.

Box 2.1: Wholesale access in transition to fibre in New Zealand

Fibre-to-the-Node is being rolled-out through "cabinetisation" in New Zealand. The Commerce Commission had to decide whether this created two wholesale markets reflecting different supply characteristics: - exchange-fed (copper) lines versus cabinet-fed lines.

For exchange-fed lines, there is competition through both unbundled local loop (ULL) and unbundled bitstream (UBA). The regulated access prices for ULL and UBA are cost-based and retail price minus avoided costs respectively.

With cabinetisation, only UBA can be used to supply broadband. This affects about 50% of lines in urban exchange service areas. As cabinets typically serve 300 -350 end users, it is uneconomic for access seekers to unbundle at cabinets (sub-loop access).

The Commission decided there is sufficient demand-side constraint to treat all lines as one market. As Telecom has a uniform retail price, any retail and associated (and automatic) UBA price increase would be likely to lead to Telecom's exchange-fed customers switching to unbundlers using DSLAMs (cost-based ULL), resulting in lost revenues for Telecom, and making the UBA price increase unsustainable.

Source: New Zealand, Commerce Commission Decision No. 731, Final Review of the Standard Terms Determination for the designated service Telecom's unbundled bitstream access, September 2011

<http://www.comcom.govt.nz/1st-competition-test-for-uba-std/>

Market definition in the ICT sector can be difficult. Effective substitutes may not be only those services supplied by similar telecommunications carriers (or by carriers at all). For example:

- Voice and data services are now available from conventional wireline or wireless networks, using either circuit-switched or packet-switched technologies,
- Voice mail services are available from telecommunications networks, answering machines, or manned answering services, and

- Some markets may be [two-sided](#) which will have regulatory implications for both pricing and merger analysis.

ENDNOTES

[1] The European Commission defines a market as the smallest group of products and the smallest geographical area in which a hypothetical monopoly could successfully implement a “small but significant and non-transitory increase in price” (or “SSNIP”).

[2] The EU Commission instructed the Polish regulatory authority that internet peering and transit were not separate markets but demand side substitutes ([Decision of 3 March 2010](#)) See [Box 3.5](#)

2.2.2 Market Power

Market power is only damaging if the firm concerned exercises its power. For example, if it raised prices above competitive levels, this would reduce demand, generate efficiency losses, and harm the public interest. In addition, firms with market power may engage in [anti-competitive behavior](#).

The European Commission defined the concept of Significant Market Power (SMP) as the ability of a firm to act independently of competitors and customers. In some jurisdictions, the term dominance is used but has a similar meaning to SMP. The World Trade Organization defines dominance as the ability of an organisation to prevent effective competition being maintained in the relevant market by having the power to behave to an appreciable extent independently of its competitors, its providers, its customers and ultimately of the consumers. In the United States it has been largely left to courts to decide what constitutes dominance and, for the most part, they have applied criteria based solely on [market shares](#).

Under the European model, firms that are found to have SMP are subject to additional *ex ante* regulatory obligations such as:

- Obligations to align interconnection prices with costs,
- Accounting separation requirements, and
- Mandatory publication of reference interconnection offers.

A high market share does not necessarily imply market power. A firm's market share may increase, at least temporarily, due to a successful new invention or better customer service. Or, incumbent telecommunications firms may have high market shares but as competition emerges, its market share cannot guarantee it the ability to charge prices higher than its competitors.

Market share in itself is neither necessary nor sufficient for market power. Firms with high market shares may be constrained from raising prices by a range of factors, including:

- Competition from other suppliers already in the market,
- Barriers to entry; a well-established firm may have exclusivity agreements with distributors, making it difficult for competitors to enter the market.
- Barriers to exit; if an entrant must incur high sunk costs to enter the market, then the entrant must be prepared to absorb those sunk costs in the event that it fails,
- The role of any essential facility; if an entrant needs access to an essential facility that is controlled by one of its competitors, this creates a barrier to entry.
- The “countervailing power” of customers in the market, for example their willingness to do without the service if the price increases.
- Any technological advantages, or privileged access to financial resources,
- Economies of scale and scope; in the telecommunications sector, a new facilities-based entrant may have no choice but to start out at a relatively large scale of operations, in order to achieve unit costs close to the incumbent's,
- Product differentiation, and
- The type and availability of sales channels.

2.2.3 Separation

There are three main forms for separating a [dominant](#) firm's competitive activity from its monopoly activities:

- **Accounting separation** which requires separate income statements and balance sheets to be maintained for the wholesale division and the retail units. The objective is to make the costs of non-competitive services transparent so that regulators and others can more easily detect possible abuses. Accounting separation is at a high level of aggregation and may not be able to detect a [price squeeze](#). The benefit of accounting separation is that it preserves the vertically-integrated structure of the firm thereby preventing the loss of vertical efficiencies. On the other hand, accounting separation does not prevent non-price discrimination – such as delays in switching customers to competitors.
- **Functional (operational) separation** which requires the retail and wholesale arms of the vertically integrated dominant access provider to act independently of each other [1]. The wholesale arm should not know if an order it receives has been placed by its sister retail unit or by a competing retail operator. Policing obligations for non-discrimination in vertically integrated operators is notoriously difficult. The 'six degrees of separation' (Table 2.2) form a spectrum of options between the other two main forms of separation.
- [Structural separation](#) is a last resort which requires an operator to separate its network infrastructure from its units offering services using this infrastructure. Also known as 'ownership unbundling' or 'divestiture', structural separation means that all of the network elements are placed in a separate legal entity.

Table 2.2: Six Degrees of Functional Separation

Structural (Ownership) Separation	
6	Legal separation (under same owner)
5	Business separation with separate governance arrangements
4	Business separation with localised incentives
3	Business separation
2	Virtual separation
1	Creation of a wholesale division
Accounting Separation	

Functional Separation

END NOTES

[1] The EU restricts separation to wholesale access services defining functional separation as “an obligation on vertically integrated undertakings to place activities related to the wholesale provision of **relevant** access products in an independently operating business entity. That business entity shall supply access products and services to all undertakings, including to other business entities within the parent company, on the same timescales, terms and conditions, including those relating to price and service levels, and by means of the same systems and processes” (Article 13a, emphasis added).

2.3 Common Forms of Anti-Competitive Conduct

The focus of this section is on the forms of anti-competitive conduct engaged in by firms with significant [market power](#). These practices include:

- [Abuse of Dominance](#)
- [Refusal to Supply](#)
- [Vertical Price Squeeze](#)
- [Cross-Subsidisation](#)
- [Misuse of Information](#)

- [Customer Lock-In](#)
- [Exclusionary or Predatory Pricing](#)
- [Tying and Bundling](#)
- [Non Discrimination and Net Neutrality](#)

In all cases, the object of regulation is to support competition as a process. Although only firms with significant market power may be stopped from engaging in the practices listed above, all firms must abstain from misleading the market (eg making false claims in advertising), “slamming” (ie claiming customers from the incumbent when the customer has not knowingly provided consent to switch providers) and unreasonable contract terms.

END NOTES

[1] See also ERG, Common Position on the approach to appropriate remedies in the ECNS regulatory framework, Final Version May 2006 _

2.3.1 Abuse of Dominance

A [dominant](#) firm abuses its power when it engages in practices with the aim of eliminating or substantially lessening. Abuse of dominance may entail:

- Refusals to deal, for example a [refusal to supply](#) an essential facility to a competitor,
- Exclusive dealing arrangements, in which a seller prevents its distributors from selling competing products or services,
- [Tying and bundling](#), where a firm sells makes the purchase of one product or service conditional on the purchase of a second product or service,
- [Predatory pricing](#), where a firm sets prices below cost in order to force a competitor out of the market,
- Non-price predation, where a firm adjusts the quality of its product offering to customers with the aim of harming its competitor. For example, an incumbent might offer an improved level of service to customers served by one new entrant.

A firm does not need to be dominant (in the sense of possessing a high market share) in order to implement these strategies. However, the consequences for competition can be particularly severe when the firm concerned is dominant.

If the firm is dominant in the relevant market, the behaviour does not necessarily constitute and abuse of its position: is the behaviour harmful to competition and to consumers? It is important to distinguish between aggressively competitive behaviour that harms individual competitors but benefits customers (for example by reducing prices), and behaviour that is anti-competitive because it harms competition.

A range of possible remedies exists. Which remedy is appropriate will depend on the specific nature and seriousness of the behaviour, and the likelihood that the firm may repeat the behaviour in the future.

Directive Remedies, such as injunctions or bans, require the firm to:

- Cease its abusive behaviour, or
- Make specific changes to its behaviour so it is no longer damaging to competition.

Directive remedies may require ongoing monitoring, to ensure that the behavioural change is sustained.

Punitive Remedies include:

- Fining the firm,
- Ordering the firm to pay compensation to its competitors and/or customers,
- Fining company officers with direct responsibility for the behaviour.

Punitive remedies are intended to discourage abusive behaviour in the first place by making such behavior unprofitable. However, this objective must be weighed against the potential to “chill” competition. If the penalty for abuse is very high, then dominant firms will “err on the side of caution” and compete less aggressively.

Box 2.2: Abuse of Dominance in Poland

In June 2011, the European Commission imposed a fine of €127 million on telecoms operator Telekomunikacja Polska S.A. (TP) for abusing its dominant position in the Polish market.

Poland has one of the lowest broadband penetration rates in Europe - in January 2010 it reached only 13%, significantly below the EU average of 24%. Consumers have also suffered from lower connection speeds: 66% of Internet access lines in Poland do not exceed the speed of 2Mbit/s compared to an EU average of just 15%. Finally, monthly prices per advertised Mbit/s were much higher than the prices in other Member States and the second highest in the OECD area.

In order to provide broadband Internet access to end-users, new market entrants need to acquire wholesale broadband access and local loop unbundling. In Poland, these are exclusively provided by TP which proposed unreasonable conditions, delayed the negotiation processes, rejected orders in an unjustifiable manner and refused to provide reliable and accurate information to alternative operators. Together, these practices prevented alternative operators from competing effectively in the market and constituted an abuse of TP's dominant position on the Polish broadband market.

Telekomunikacja Polska's total turnover in 2010 was € 3.9 billion (PLN 15.7 billion). The fine takes account of the duration and gravity of the infringement and has been calculated on the basis of the average value of TP's broadband sales between 2005 and 2009 in Poland. TP's turnover in 2010 was € 3.9 billion.

Source: European Commission, Press Release, 22 June 2011.

Some form of [separation](#) may also be considered.

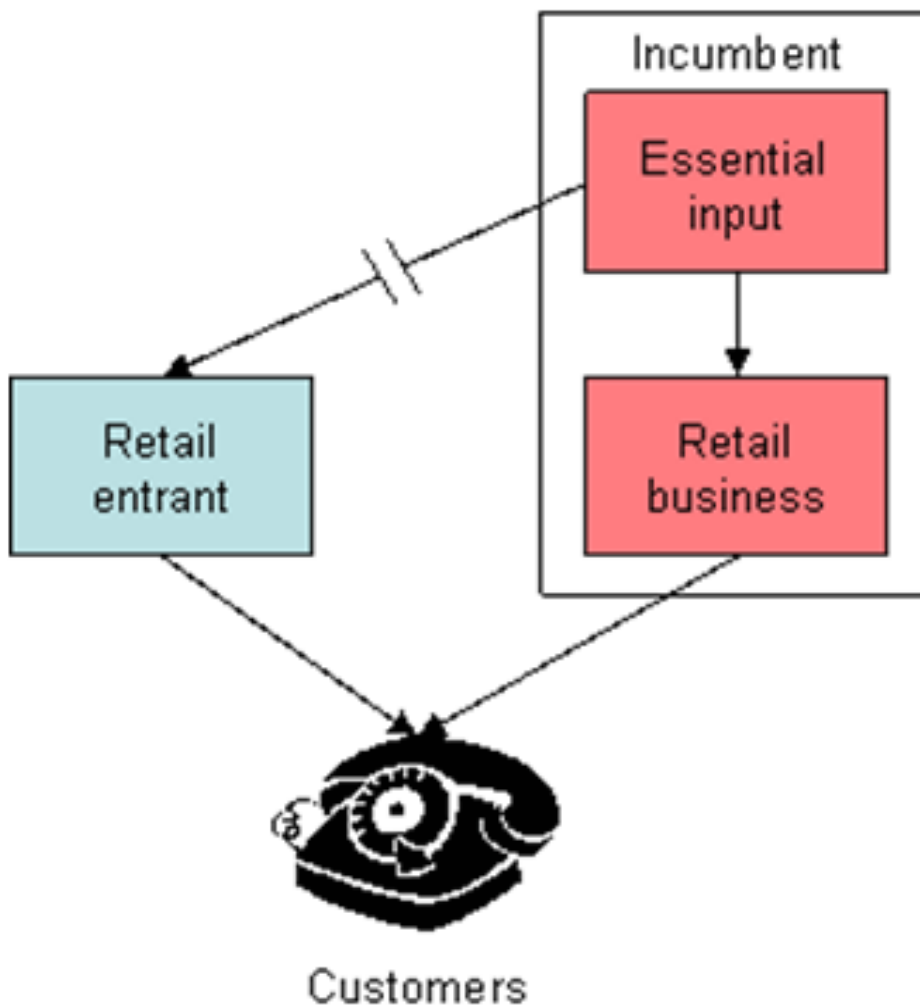
2.3.2 Refusal to Supply

Incumbent firms often control access to facilities that are essential inputs in the supply of services at the retail level. Competing retailers depend on the incumbent for access to the [essential facility](#). In the telecommunications sector, the local loop connecting end customers to the local exchange is often regarded as an essential facility.

Incumbent firms may attempt to prevent competitors from entering the market by refusing to provide access to an essential facility or withhold information..

The figure below shows a vertically integrated incumbent firm (red) and a downstream entrant (blue). The incumbent firm controls an essential input, on which the downstream entrant depends in order to provide services to its customers. The incumbent also competes with the downstream entrant at the retail level. By refusing to supply the essential input, the incumbent can prevent the downstream entrant from competing.

Figure 2.2: Refusal to Supply an Essential Facility



To encourage competition, many jurisdictions require firms with control over essential facilities to provide access to competitors. Rules may also determine the way in which access prices will be agreed, and procedures for resolving any disputes.

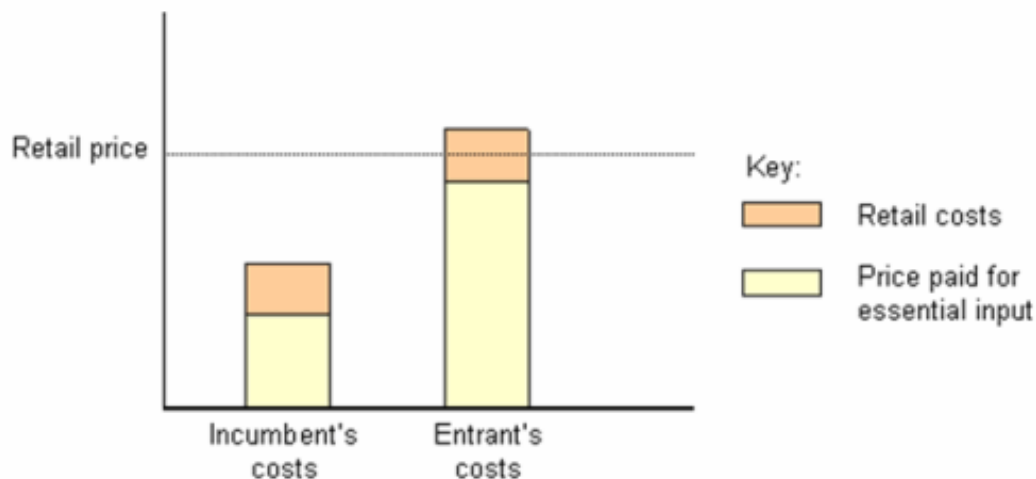
Refusal to supply may include deliberate delays and obstruction such as 'losing the keys to the exchange' where a competitor has the right to co-locate equipment in an exchange under supervision.

2.3.3 Vertical Price Squeeze

A firm which is vertically integrated and controls an essential input to the retail service implements a price (Figure 2.3) squeeze if:

- The price the firm demands makes it impossible for an equally-efficient retail-stage competitor to operate profitably (or even survive) given the level of retail prices, and
- The firm does not charge its own downstream operation this high price.

Figure 2.3: Example of a Vertical Price Squeeze



A price squeeze has a similar effect to a [refusal to supply](#) an essential facility. In the extreme, the firm might demand a price for the essential input that is higher than the full retail price of the service.

Box 2.3: Margin Squeeze in Spain

The EU Commission fined Telefónica €151.9 million in July 2007 for a margin squeeze between its retail prices and the prices for wholesale broadband access at both the national and regional levels between September 2001 to December 2006. It was a large fine because Telefónica's 2001 business plan knew it would be engaging in a margin squeeze.

Wholesale access at national level allows alternative operators to offer retail broadband services throughout the Spanish territory by connecting to a single, "national" access point. Wholesale access at the regional level requires that alternative operators roll out a costly network reaching up to 109 "regional" access points.

Although Telefónica provides unbundled access to its local loops, this was not considered a substitute for the other two wholesale products because its investment intensity.

Lower and fairer wholesale prices putting an end to the margin squeeze were introduced at the end of December 2006 when, following a market analysis, the Spanish regulator reduced Telefónica's wholesale prices by between 22% and 61%.

Sources: *Antitrust: Commission decision against Telefónica - frequently asked questions*, MEMO/07/274 July 2007 <http://europa.eu/rapid/pressReleasesAction.do?reference=MEMO/07/274&format=HTML&aged=0&language=EN&guiLanguage=en>
European Commission (staff analysis), Margin squeeze in the Spanish broadband market: a rational and profitable strategy, Jean-Christian Le Meur, Iratxe Gurpegui and Katja Viertio
http://ec.europa.eu/competition/publications/cpn/2007_3_22.pdf

[International approaches](#) to price squeeze differ:

- In the EU, the existence of price squeezing by a dominant operator is sufficient to find an abuse of dominance; price squeezing is treated as an illegitimate use of market dominance in and of itself.
- In the United States, price squeezing is not linked to dominance and is not considered to be

inherently anti-competitive. Price squeezing only attracts liability if it is [predatory](#) or if the firm concerned is obligated to provide the goods or services; on its own, however, price squeezing is merely part of a robustly competitive market.

- In [New Zealand](#), a causal link has to be established between the impugned conduct and dominance. This is done by applying a counterfactual test whether the prices charged are no greater than the prices found in a hypothetical competitive market. If not, then the dominant firm would not have “used” its market powers. The basis for this test is the "Efficient Component Pricing Rule" (ECPR), which is discussed below.

A number of remedies for this price squeezing exist, including:

- [Resale Obligations](#) or
- Price floors, or
- [Structural remedies](#)

A price floor sets a minimum retail price for the incumbent’s retail service, with reference to wholesale prices. A price floor should ensure that competitors that as efficient as the vertically integrated firm are able to cover their costs. The rule for setting a price floor, or "imputation rule" can be stated in a number of ways:

The retail price *must be no less than* the wholesale price plus the direct incremental cost of the vertically integrated firm’s pure retailing functions.

$$Pr > Pa + Cr$$

Equivalently, the retail price *must be no less than* the vertically integrated firm’s direct incremental cost to supply the product, plus the profit margin it could earn from selling the essential input to its competitors.

$$Pr > Ca + (Pr - Pa - Cr)$$

Or, the profit margin on the vertically integrated firm's price for the retail product *must be no less than* the profit margin it earns from selling the essential input to its competitors.

$$(Pr - Ca - Cr) > (Pa - Ca)$$

All the above imputation rules are equivalent, but provide different insights into the conditions that must hold for a vertical price squeeze to be impossible.

Box 2.4: Price Squeeze in Germany

In 2003, Deutsche Telekom (DT) was found to have abused its dominant position by committing a price squeeze. From 1998, DT has been legally obligated to provide competitors with wholesale access to its local loops. The European Commission found that from 1998 to the end of 2001, DT charged new entrants higher fees for wholesale access to the local loop than what DT charged its retail subscribers for fixed line (analogue, ISDN, and ADSL) subscriptions – so the margin was negative ($Pa > Pr$) even before allowing for a competitors own retail costs. From 2002, there was a margin ($Pa < Pr$) but it was not big enough to cover retail costs (Cr).

DT argued that its wholesale prices were regulated and it had to meet competition in the retail market. But the Commission argued that DT had the freedom to terminate the squeeze itself. In fact, DT increased retail prices (but not enough) in 2002.

To remedy the competition concern, DT terminated the margin squeeze mainly by lowering its wholesale access fees.

Source: European Commission (Staff Analysis): Two Commission decisions on price abuse in the telecommunications sector, Competition Policy Newsletter, Autumn 2003

These measures may achieve the objective of preventing a price squeeze, but they can have substantial costs. In particular, under structural separation the firm would lose any efficiencies or cost savings from vertical integration. This loss would ultimately fall on customers, through higher prices.

2.3.4 Cross-Subsidisation

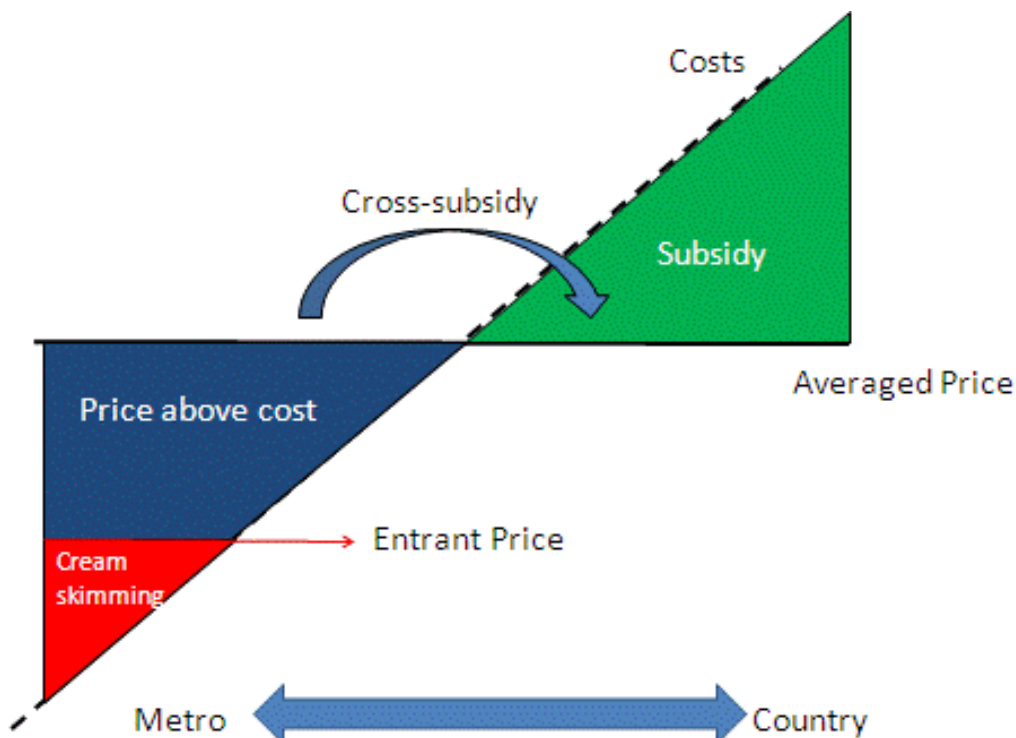
A cross-subsidy may be anti-competitive when a firm with market power prices services in less competitive markets higher so that it can have lower price for services it sells into competitive markets.

Not all cross-subsidies are anti-competitive. Traditionally, telephone operators have cross-subsidized high-cost (under-priced) services from low-cost (over-priced) services:

- Line rentals or handsets from call revenues
- Residential customers from business customers in line rentals
- Country customers from metropolitan customers

Cross-subsidy has been important in driving adoption of both fixed and mobile services. But this worked only when access and calls were joint in both supply and demand, as with fixed monopoly and mobiles. With the introduction of competition for calls, cross-subsidies are "cream-skimmed" (Figure 2.4).

Figure 2.4: Cross-subsidy and Competition



New entrants do not complain about the above cross-subsidies as they provide scope for profit in serving low-cost markets. Competition is very good at attacking cross-subsidy.

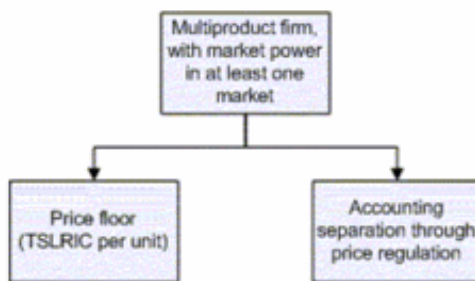
Incumbents complain about “cream-skimming” competition allowed by the cross-subsidies above. So, regulators assist incumbents with [price rebalancing](#) to meet competition, which generally increases line rentals so that call prices can fall. This is a politically sensitive process because raising access prices disadvantages the poorer users who make fewer calls; so some policy direction may be needed.

Anti-competitive pricing can be difficult to identify. Ideally, competition drives prices to marginal cost. But in network industries, the cost curve declines across the range of possible levels of output so prices must be set above marginal cost to recover all costs. Since the network supports many different services, it is difficult to say which services are cross-subsidising others.

The remedies for cross-subsidization are preventative in nature:

- Implement and enforce a price floor,
- Require accounting separation of the costs of the firm's competitive and non-competitive products.

Figure 2.5: Remedies for Cross Subsidization



Price Floor

For a firm that at least breaks even across all of its products, any single product receives a subsidy if the revenue it generates fails to recover its *total service long run incremental cost (TSLRIC)*. Thus, the effective price floor in a test of whether a product receives a subsidy is:

$$TSLRIC \text{ of the service} / \text{number of units produced}$$

For a multiproduct firm, the rule for preventing cross-subsidization requires that, for a firm that at least breaks even, every product must satisfy this price floor test.

Accounting Separation

The objective of accounting separation in this context is to separate the costs of the firm's competitive and non-competitive products. This can be achieved through price regulation (either direct regulation, or a [price cap](#)). Such regulation can prevent cross-subsidization by allocating competitive and non-competitive products to separate “baskets”, with separate controls or rules for the each basket.

2.3.5 Misuse of Information

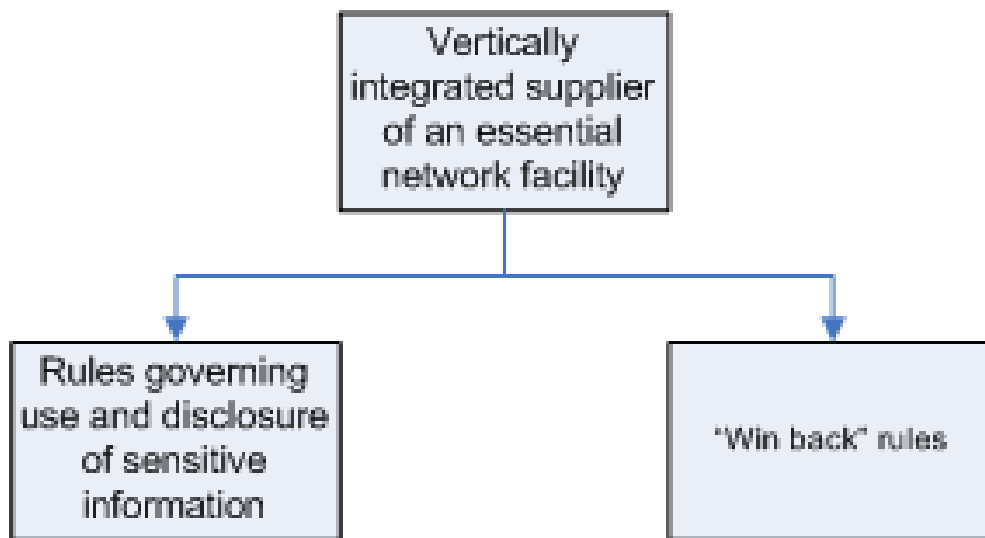
It is common for vertically integrated firms to sell wholesale products to other firms, while competing against those same firms in retail markets. In this situation the vertically integrated firm can obtain sensitive commercial or business information through its wholesale transactions that gives it a competitive advantage in its retail activities.

Two of the three anti-competitive practices proscribed by the WTO [1] concern misuse of information:

- (a) engaging in anti-competitive [cross-subsidization](#);
- (b) using information obtained from competitors with anti-competitive results; and
- (c) not making available to other services suppliers on a timely basis technical information about essential facilities and commercially relevant information which are necessary for them to provide services.

For example, suppose a vertically integrated incumbent firm is the sole source of dedicated access lines needed to provide retail private line services. Other firms may have no choice but to acquire wholesale dedicated access lines from the incumbent. To complete the wholesale transaction, the incumbent needs information about the identity, size, and other characteristics of end-users being targeted by its competitors. It could use this information to target the same end-users with superior service offerings, placing its competitors at a considerable competitive disadvantage. This would constitute a misuse of information.

Figure 2.6: Responding to misuse of information



Remedies for misuse of information are generally *ex ante* in nature, and include:

- Establishing strict rules or procedures governing the use or disclosure of commercially sensitive information, and setting limits on the sharing of sensitive information between a carrier and its affiliates
- “Win back” rules, limiting the extent to which the vertically integrated firm may directly market to customers that choose to switch to a competitor.

END NOTES

[1] World Trade Organisation Reference Paper, available online at: http://www.wto.org/english/news_e/pres97_e/refpap-e.htm.

2.3.6 Customer Lock-In

Service providers may attempt to “lock in” customers to prevent them from switching to alternative products, technologies, or suppliers. Customer lock-in involves raising customers’ **switching costs** to the point that the cost of switching outweighs the potential benefits from switching.

Switching costs may be:

- **Transactional**, for example the cost of replacing existing equipment and technology in order to move to a different service provider, or
- **Contractual**, for example penalties for breaking an existing contract with one service provider, in order to switch to a new service provider.

Contractual provisions that increase switching costs are not necessarily anti-competitive. Service providers may use contractual provisions that ensure customer loyalty to recover legitimate underlying costs over a period of time, for example:

- Service providers may incur substantial upfront fixed costs to acquire and serve customers. For example, it is common for mobile service providers to subsidize the cost of mobile handsets and recover the cost of the subsidy through service charges over time,
- Service providers may have incentives to spread non customer-specific fixed costs over as many customers as possible. In order to do this, a service provider may use contractual provisions to ensure customer loyalty and maintain its installed customer base.

Where the customer’s switching cost is less than the *present value* of the expected revenue from the customer, competing firms may offer to pay the customer’s switching cost. In this case, switching costs are not effective as a means of locking in customers.

High switching costs and customer lock-in tactics do not necessarily cause problems for competition or exclude competitors. Most service agreements that seek to lock-in customers do not warrant regulatory interference. Indeed, in some cases, high switching costs may trigger market responses that improve efficiency.

Cases of lock-in need to be considered on a case by case basis, taking account of:

- The degree of competition in the market,

- Whether the firm in question has market power, or a dominant position, and
- The effect of the locking-in arrangements on competition. Are the arrangements blocking efficient competitors?

2.3.7 Exclusionary or Predatory Pricing

Predatory pricing is a pricing strategy used by an established firm to eliminate competition from equally efficient firms, and secure a monopoly position in a previously competitive market. A firm practicing predatory pricing lowers its price below cost and maintains it there until equally efficient competitors are forced to incur unsustainable losses and exit the market. The firm then raises its price to a monopoly level in order to recoup its lost profits.

The US Supreme Court defines predatory prices as “below-cost prices that drive rivals out of the market and allow the monopolist to raise its prices later and recoup its losses”.

Predatory pricing is a risky strategy. The firm involved incurs high up-front losses, with no guarantee of future gains from monopolization. The strategy will only be profitable if, once all competitors have been forced out of the market, the incumbent is able to raise its prices to a monopoly level and keep them there. If the firm is subject to either direct price regulation or some other form of control, predatory pricing is unlikely to succeed.

Predatory pricing requires high barriers to entry. If firms are able to enter the market easily, then each time the incumbent increases its price this will attract new entrants into the market, forcing the incumbent to drop its price again.

Predatory pricing is notoriously difficult to prove. It can be difficult in practice to distinguish predatory pricing from aggressively competitive below-cost pricing (such as “loss leaders” and promotional activities).

Box 2.5: UK: UUNet's claims of predatory pricing against BT

In 1995, a competing internet service provider, UUNet, alleged that BT was engaging in predatory pricing for its internet access service (provided through BTNet). UUNet complained that a BTNet offer at a price 9 times less than BT's comparable services was anti-competitive, and BTNet was not recovering its cost; furthermore, BT was offering a free trial period of subscription. The British regulatory agency Oftel (now Ofcom) found in 1997 under the following conditions:

- Barriers to entry were low and, therefore, BT could not expect to exclude competitors from the market and gain the market power needed to recoup losses in the long run
- BT's other internet services were distinguishable from the BTNet service and, therefore, UUNet's comparison was not well-founded
- Early BTNet losses not recovered were consistent with start-up business trends and that BT's projected figures showed more profitability
- Free promotional subscriptions were commonplace in the industry, and BTNet had limited the offer to the initial period

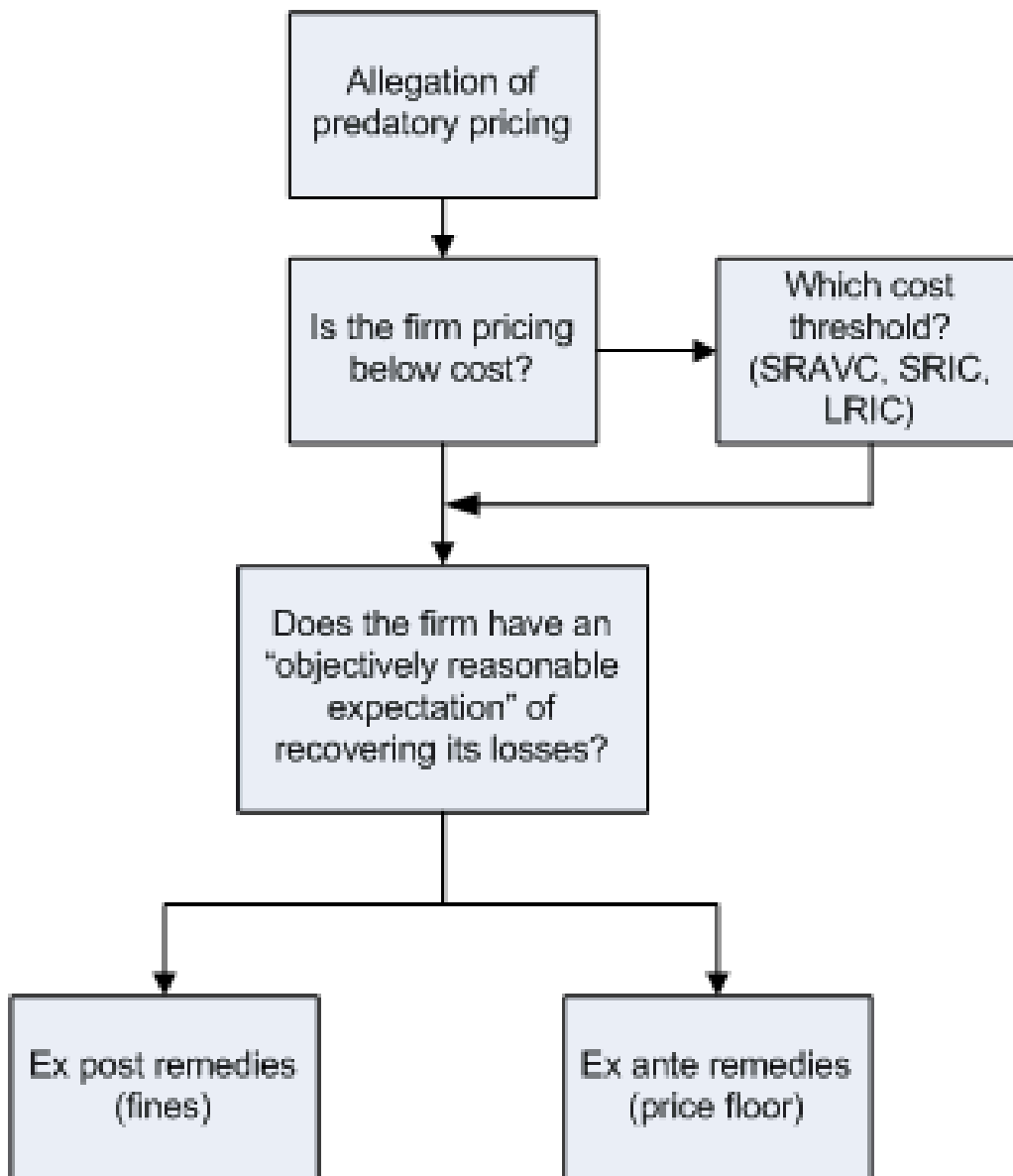
Oftel's final ruling was that BT had not engaged in any form of predatory pricing, although Oftel did continue to monitor BT due to its significant market presence.

Source: Ofcom's Competition Bulletin Issue 6, October 1997

Establishing whether predatory pricing has taken place requires that two tests be met (see Figure 2.7):

- Is the firm pricing below cost? And
- Whether the firm has an “objectively reasonable expectation” of being able to recover the losses it must incur by pricing at below cost.

Figure 2.7: Remedies for Predatory Pricing



Is the Firm Pricing Below Cost?

There is no universally accepted test to determine whether a firm is pricing below cost. According to EC case law two tests are possible to find an abuse in the form of predatory pricing:

- where variable costs are not covered, an abuse is automatically presumed;

- where variable costs are covered, but total costs are not, the pricing is deemed to constitute an abuse if it forms part of a plan to eliminate competitors.

Box 2.6: France: Wanadoo DSL pricing

From the end of 1999 to October 2002, Wanadoo, a 72% owned subsidiary of France Télécom, marketed Wanadoo ADSL at prices which were well below variable costs until August 2001 and then significantly below total costs.

Since the mass marketing of Wanadoo ADSL began only in March 2001, the Commission considered that the abuse started only on that date. Wanadoo suffered substantial losses up to the end of 2002 as a result of this practice. The practice coincided with a company plan to pre-empt the strategic market for high-speed Internet access. From January 2001 to September 2002, Wanadoo's market share rose by nearly 30 percentage points to between 65% and 75 % on a market which saw more than a five-fold increase in its size over the same period.

The abuse came to an end in October 2002, with a 30 percent reduction in wholesale prices charged by France Télécom.

Source: European Commission (staff analysis), Two Commission decisions on price abuse in the telecommunications sector, Competition Policy Bulletin, No. 3, Autumn 2003

Under the Areeda-Turner rule, prices must be below a firm's short run marginal cost to qualify as predatory pricing. Recognizing that short run marginal cost is very difficult to measure, alternative short run measures of cost may be used (*short run average variable cost, SRAVC, or short run incremental cost, SRIC*).

Many economists promote the use of *long run incremental cost* (LRIC) as the appropriate cost threshold for predatory pricing. If two firms are equally efficient, they must have the same long run incremental cost. When one of them sets a price below LRIC, the other firm cannot match that price without incurring a loss.

Regardless of the measure used, calculations of firm-specific costs for individual services can be highly contentious.

Does the Firm Expect to Recover its Losses?

Many practitioners are skeptical about the prospect that a firm could know in advance all of the information needed to implement a predatory pricing strategy. In order to have a reasonable expectation that the strategy will succeed, the firm must know:

- How long it must price below cost before it succeeds in forcing its competitors out of the market,
- The size of the loss that it must withstand while predatory pricing is in effect, and
- The probability that it will recover its losses once it has achieved a monopoly.

Remedies

Ex post antitrust remedies, such as fines or compensation, may be available for proven instances of predatory pricing. However, predatory pricing is difficult to prove with sufficient certainty to justify punitive measures.

A more useful remedy for predatory pricing is an appropriate price floor for the affected product or service. This is a preventive remedy, requiring *ex-ante regulation*.

2.3.8 Tying and Bundling

Tying of services occurs where a service provider makes the purchase of one product or service over which it has market power (the "tying good") conditional on the purchase of a second, competitively supplied, product or service (the "tied good"). By tying services, a service provider can try to use market power in one market to give itself an advantage in another, competitive market. Customers who opt to buy the tied good from a competitor cannot find a feasible substitute for the service provider's tying good.

Tying is primarily a strategy to maximize profits. It can be profitable:

- where the demands for the two products are complementary, such that end users consume both products together (for example a network subscription and local calls), or
- if the tying good is regulated and the regulated price is below the service provider's profit maximizing level. In this case a successful tying strategy would enable the service provider to increase its overall profitability by increasing the price of the tied good.

Box 2.7: Tying in Morocco

Until 2002, Maroc Télécom was Morocco's only incumbent basic telecommunications service provider and operated the only fixed network in the country.

Amidst de-regulatory steps taken in Morocco in 1999 and after, Médi Télécom was licensed to operate a GSM mobile network in competition with Maroc Télécom. In early 2001, Maroc Télécom began offering a 10% discount to anyone calling a Maroc Télécom mobile phone from a fixed line. Its competitor, Médi Télécom charged that this was anti-competitive and complained to the Moroccan National Telecommunications Regulatory Agency (ANRT).

The ANRT reviewed the case and concluded that the discount offered only to Maroc Télécom customers was discriminatory and constituted an act of abuse of dominance, given that Maroc Télécom was to remain the fixed network monopoly until 2002. Maroc Télécom eventually suspended the 10% discount in light of the ANRT's ruling.

Source: ITU Case Study of Effective Regulation: Morocco

Tying will not be profitable where:

- The demands for the two products are independent, so that end users are unlikely to consume them jointly,
- The price of the tying good is already at the service provider's profit maximizing level. In this case there is no room to increase profits further, or
- The two products are consumed in fixed proportions. To maximize its profits, all the service provider needs to do is set the price for the product over which it has market power at its profit maximizing level.

A tying strategy is only likely to exclude competitors from the market for the tied good if competitors are unable to overcome the loss of sales to customers who have been successfully tied. For example this

might be the case if:

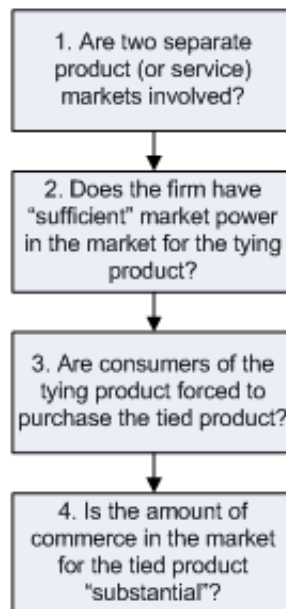
- Competitors face *economies of scale*, so that a loss of sales causes their average costs to increase, or
- The tied good is associated with *network externalities*, so that a loss of sales to some customers causes other customers to drop off as well.

Even where tying does have an exclusionary effect, this may be an unintended consequence of a strategy to maximize profits.

There are few circumstances in which tying can be profit-enhancing for the firm concerned. Accordingly firms with market power will often have no incentive to engage in a tying strategy.

In recognition of this, the courts in the United States have developed a four-part test for analyzing allegations of tying (see Figure 2.8).

Figure 2.8: USA: Test for Alleged Tying



In addition to the tests illustrated in Figure 2.8, some courts require that the alleged harm exceed any efficiencies produced by the alleged tying, before allowing a complaint to proceed.

Service **bundling** occurs where a service provider offers two or more services separately, but gives a discount to customers who purchase the services as a combined bundle.

Bundling is common in telecommunications and other multiproduct industries, reflecting both cost savings from producing services jointly, and consumer preferences for service bundles. In telecommunications, local and long distance services are often bundled with services such as call waiting, call forwarding, voice mail, or Internet access.

Bundling is generally a pro-competitive, and customer friendly, strategy. As such bundling does not call for regulatory intervention.

2.3.9 Non Discrimination and Net Neutrality

The Internet has flourished in part due to a “hands off” approach by governments and the apparent willingness of all stakeholders to cooperate and self-regulate. As the amount of video traffic increases, carriers may feel the need to adopt network management practices to control congestion of their networks. Some carriers may try to take the opportunity to extract value by prioritizing traffic in ways which violate the tradition of [network neutrality](#).

Box 2.8: USA: Comcast and the FCC

In 2008, the U.S. Federal Communications Commission attempted to order Comcast, a cable TV and Internet access provider, to cease blocking or downgrading certain users’ access to some high capacity peer-to-peer download services. There was no attempt to impose capacity charges or separate pricing tiers, and other high capacity usage, such as video streaming or VoIP, was not treated similarly. On the surface, it appeared that Comcast was simply trying to discourage peer-to-peer file sharing itself, although it had no specific policy to do so. The FCC’s ruling, however, was subsequently struck down on appeal in court, leaving U.S. law undecided as to the FCC’s authority to implement net neutrality regulations.

Source: ITU, Telecommunications Regulation Handbook, 10th Anniversary Edition, 2011

Regulators are moving tentatively to decide how far they need to intervene. While many see the need for transparency about traffic management rules, only a few have moved to set traffic management rules.

Table 2.3: Status of net neutrality initiatives in selected countries

Stage in process	Position along the spectrum (least to most stringent)	Country
No consultation	Considered net neutrality, but found no problems requiring a consultation and subsequent rule; will continue to monitor	Denmark Germany Ireland Portugal
	Non-binding neutrality guidelines	Norway
In consultation stage	Information gathering on current practices to potentially establish rules	Italy (Feb. 2011)
	Transparency/disclosure rules proposed, but no traffic management	United Kingdom
	Transparency/disclosure rules and traffic management/non-discrimination rules proposed	Brazil Sweden (Feb. 2011)
Rules/legislation adopted	Transparency/disclosure rules but no traffic management/non-discrimination rules	European Commission (Apr. 2011)
	Transparency/disclosure rules and traffic management/non-discrimination rules	Canada Chile (Jul. 2010 and Mar. 2011) France (Feb. 2011) United States (Dec. 2010)

Source: infoDev (2011) Broadband Strategies Handbook

In December 2010, the US Federal Communications Commission set-out three basic rules for net neutrality [1]:

- **Transparency.** Fixed and mobile broadband providers must disclose the network management practices, performance characteristics, and terms and conditions of their broadband services;
- **No blocking.** Fixed broadband providers may not block lawful content, applications, services, or non-harmful devices; mobile broadband providers may not block lawful websites, or block applications that compete with their voice or video telephony services; and
- **No unreasonable discrimination.** Fixed broadband providers may not unreasonably discriminate in transmitting lawful network traffic.

Box 2.9: USA: Discrimination and Google

In 2011, the US Federal Trade Commission started investigating whether Google is dominant and discriminating in favour of its own services. For example, Yelp, a Web site for user reviews of restaurants and other businesses which gets half of its traffic from Google claims it has noticed a difference in its search rankings since Google acquired Zagat, another restaurant listing and review service.

In November 2010, the European Commission initiated formal proceedings against Google following complaints from several search service providers that Google has abused a dominant market position in online search, online advertising and online advertising intermediation.

Source: European Commission probes allegations of antitrust violations by Google, 30 Nov 2010

European regulators advised the European Commission that forbearance should apply to the emerging issues of net neutrality noting in its report [2] that there have been several cases of throttling of p2p file sharing or video streaming (for all sites or specific sites), and blocking of VoIP in mobile networks. In April 2011, the EU Commission noted that more information was needed before it recommended stronger measures [3].

The Dutch version of **net neutrality** (Box 2.10) goes further than the new US rules. For example, Apple can still try and block [jailbreaking](#).

Box 2.10: Mobile Net Neutrality in the Netherlands

In April 2011 KPN, the incumbent in the Netherlands, issued a profit warning in which it cited Blackberry's Ping and WhatsApp (an application that allows users to text messages for no additional charge on any smartphone) for an 8% decrease in mobile revenue. It also announced plans to charge mobile customers extra for using such apps. Vodafone already charged customers an additional fee to use Skype on smartphones, while T-Mobile prohibited subscribers from using Skype or WhatsApp in its terms and conditions.

But, to apply such charges operators use 'deep packet inspection'. Following loud complaints about possible privacy violations, in June 2011, the Dutch parliament passed a bill which will force mobile providers to let customers use Skype and other apps on their networks without charging extra or giving preferential treatment to their own offerings.

To comply with the new law, KPN revised its mobile plans from September 2011, reducing entry level plan data allowances, charging more for data in the bundle to better align usage and cost and reducing subsidies on smartphones.

Sources: <http://www.physorg.com/news/2011-06-dutch-parliament-mobile-net-neutrality.html> and <http://www.totaltele.com/view.aspx?ID=466356>

Data will dominate mobile operators' network traffic and their pricing models will align more with data to reflect this [4]. This is an example of how markets can adjust to technology changes without help from regulators.

ENDNOTES

[1] FCC (December 2010) Open Internet Rules, Report and Order 10-2010

[2] This report lists all the incidents which were resolved without formal proceedings. BEREC (formerly ERG) Response to the European Commission's consultation on the open Internet and net

neutrality in Europe, September 30, 2010

[3] The open internet and net neutrality in Europe, EU, 19 April 2011

[4] As an example, in June 2010, AT&T scrapped its \$30 per month unlimited mobile data plan and offered new smartphone buyers a choice of 200MB monthly cap at \$15 or a 2GB cap for \$25 per month. In March 2011, it announced plans to introduce data usage caps for fixed broadband customers too.

2.4 Mergers, Acquisitions and Joint Ventures

Mergers, acquisitions, and joint ventures are all different ways for two or more firms to integrate or coordinate their operations:

- A [merger](#) is a structural fusion of two firms that results in a common ownership and management structure. Mergers usually happen through stock swaps.
- An [acquisition](#) is a type of merger in which a firm with more resources and greater market strength may acquire another firm. The acquiring firm usually uses some combination of stocks, debt, and cash to finance the transaction.
- A [joint venture](#) is a strategic alliance between two firms that share resources, equity, revenues, expenses, and management to pursue a common goal. Each firm usually retains its own corporate identity.

There are three types of mergers: horizontal, vertical, and conglomerate. Conglomerate mergers occur between firms operating in separate markets. As such they do not generally raise competition concerns and are not covered further in this section.

Mergers, acquisitions, and joint ventures are motivated by a range of factors such as cost savings from synergies between the firms or economies of scale and scope, efficiencies from vertical integration, or geographical diversification or cross-selling of products.

The Role of Competition Authorities and Regulators

Provisions governing mergers and acquisition are generally included in competition or antitrust laws, where these exist. In this case, investigation of proposed mergers is usually the responsibility of a competition authority.

Some countries with no competition law have included sector specific merger provisions in their telecommunications laws (for example Hong Kong).

In countries with both a competition authority and a telecommunications regulator, both agencies may have a mandate to investigate mergers in the telecommunications sector. For example, in the US the Federal Trade Commission and the Justice Department have a general responsibility to investigate potentially anti-competitive mergers. However, the Federal Communications Commission may also investigate horizontal mergers between telecommunications firms to determine whether or not the merger is “in the public interest” [1].

END NOTES

[1] See Practice Note [Structural Separation](#) on consolidation of companies formed since the AT&T divestiture in 1984.

2.4.1 Mergers and Acquisitions

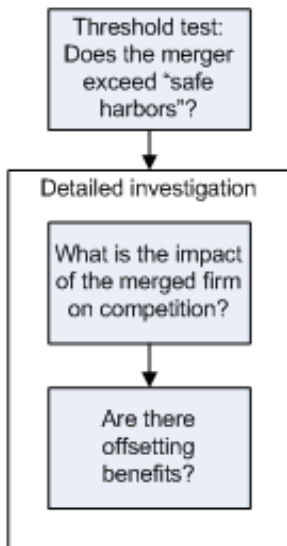
Mergers can be horizontal - bringing together firms that produce the same product within the same market – or vertical – bringing together firms in potential customer-supplier relationships.

Analysing Horizontal Mergers

By definition, horizontal mergers reduce the number of actual competitors in the [market](#). Horizontal mergers may also produce cost savings [1] and other benefits. If these benefits outweigh any reduction in competition, then the merger should be allowed to proceed.

Competition authorities commonly take a two-stage approach to analysing horizontal mergers (see Figure 2.9).

Figure 2.9: Two Stage Process for Analysing Mergers



The first stage uses measurable thresholds or “safe harbors” to determine whether a merger is likely to raise serious competition concerns. If a merger falls within the specified threshold then it is considered to be “safe”, and may proceed without further investigation.

Like the USA, the EU calculates the [Herfindahl-Hirschmann Index](#). While the absolute level of the HHI can give an initial indication of the competitive pressure in the market post-merger, the EU looks at the change in the HHI as a useful proxy for the change in concentration directly brought about by the merger.

The purpose of these thresholds is to focus resources on investigating those transactions that are most likely to raise serious competition concerns. Those mergers that do not fall within specified safe harbors are investigated in depth.

The EU Commission [2] assesses "horizontal mergers" where the undertakings concerned are actual or potential competitors on the same relevant [market](#). See [KPNQWest/Ebone/GTS Horizontal Merger](#) on one market assessment. The Commission's assessment of mergers normally entails:

- definition of the relevant product and geographic [markets](#);
- competitive assessment of the merger.

The EU Commission also takes account of a number of factors (such as the possibilities for customers of switching supplier or the possibilities for competitors to respond to the merger) which may influence the likelihood that a merger will have significant anticompetitive effects.

Box 2.11: UK: Orange and T-Mobile Merger

The merger of Orange and T-Mobile (UK subsidiaries of France Télécom and Deutsche Telekom) into Everything Everywhere, cleared on 1 March 2010, reduced the number of network operators from five to four. The UK Office of Fair Trading (OFT) had two concerns about the impact on competition.

First, the smallest remaining mobile network operator, 3UK, depended upon T-Mobile for 3G (radio access network) infrastructure sharing and on Orange for 2G national (voice) roaming. The remedy was a revised commercial agreement between T-Mobile, Orange and 3UK on post-merger infrastructure sharing roaming including a fast-track dispute resolution process.

Second, the parties' combined contiguous spectrum could result in the new entity being the only mobile network operator in the UK able to offer next-generation mobile data services through Long Term Evolution (LTE)

technology at the best possible speeds in the medium term. The remedy was a commitment that the merged entity would divest a quarter of their combined spectrum in the 1800 MHz band.

Sources:

European Commission (staff analysis), Of spectrum and radio access networks: the T-Mobile/Orange joint venture in the UK, Competition Policy Newsletter, No. 2, 2010 and European Commission: T-MOBILE/ ORANGE, March 2010

The EU Commission also undertakes to take account of efficiency or profitability criteria that undertaking might claim in order to mitigate any adverse impact on competition; in such cases, the undertakings would, of course, have to show that the efficiency was indeed attributable to the merger and would be beneficial for consumers.

If a merger is found to generate benefits that do not outweigh the damage to competition, then in some jurisdictions regulatory authorities may impose ex ante obligations on a merged firm, where the merger would otherwise be anti-competitive. In both the United States and Europe, National Regulatory Authorities may impose conditions on a merger that would otherwise be anti-competitive.

Box 2.12: Austria: T-Mobile and tele.ring merger

Conditions were imposed for the horizontal merger approved by the European Commission in April 2006. The Austrian subsidiary of T-Mobile (part of the Deutsche Telekom group) merged with a small competitor, tele.ring (controlled by US Western Wireless Corporation).

Some firms have more of an influence on the competitive process than their market shares would suggest. Before the merger, tele.ring exerted competitive pressure on the two largest Austrian operators, Mobilkom and T-Mobile Austria. The merger could have changed competitive dynamics significantly.

It seemed that no other operator could take over the role that tele.ring played. H3G had offered the next most attractive prices and in 2005 nearly half the customers who ported their numbers away from tele.ring went to H3G. But H3G was even smaller, had a network with only 50 percent population coverage and a roaming agreement with Mobilkom which raised its variable costs reducing its potential to be a vigorous price competitor.

The Commission approved the merger on the basis of T-Mobile's legally binding commitments to H3G to sell it UMTS frequencies and mobile telephony sites (including all necessary technical equipment). According to H3G, these acquisitions would allow it to achieve complete network coverage of the population quickly. Building its own network nationally would also eliminate H3G's dependence on the national roaming agreement with Mobilkom, reduce its variable per minute costs considerably and allow H3G to achieve much larger economies of scale. And the extended network and enhanced capacity would provide the incentive to price aggressively to "fill" the network.

Source: European Commission (staff analysis), T-Mobile Austria/tele.ring: Remedying the loss of a maverick, Competition Policy Bulletin, No. 2, Summer 2006

Analysing Vertical Mergers

Vertical mergers involve complementary services while horizontal mergers involve substitute services. Vertical mergers are generally considered beneficial where they can:

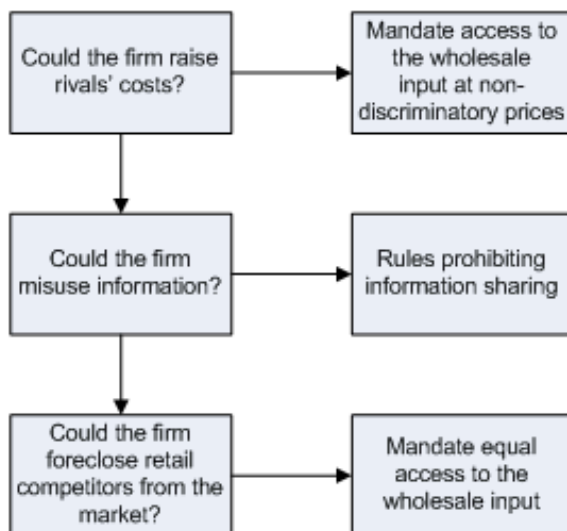
- Reduce transaction costs by improving coordination between the services,
- Improve efficiency through more integrated production, and
- Eliminate "double markups" [3].

Vertical mergers are more likely to increase efficiency than horizontal mergers but may raise competition

concerns in limited sets of circumstances. Competition authorities in the United States typically pay attention to three issues (see Figure 2.10). Could the merged firm:

- Raise the costs of its retail rivals? For example, suppose a retail firm merges with the supplier of a wholesale input. By removing a source of supply from the wholesale stage of the market, the retailer is able to increase the price of the input to its competitors (but not to itself). If it can, the remedy is a requirement that the wholesale resource be made available at non-discriminatory prices.
- Misuse competitively sensitive information gathered about rivals when selling them the wholesale resource? If it can, the remedy is to implement rules and procedures to prohibit information-sharing between the firm's retail and wholesale operations.
- Foreclose retail competitors from the market by exercising market power at the wholesale stage of the market? The merged firm may withhold supply of the essential facility to its retail competitors, preventing them from competing. If it can, the remedy is to require the merged firm to provide equal access to the wholesale resource to its non-integrated retail-stage competitors.

Figure 2.10: Analysing Vertical Mergers



See the conditions imposed to allow the [Telia/Sonera Merger](#) which raised both horizontal and vertical merger concerns.

Box 2.13: EU and Vertical Mergers

In many merger cases in mobile telecommunications, the issue at stake could be that of horizontal overlaps in activities of the parties in their respective markets (reduced competition) or vertical relationships between the markets for wholesale international roaming and the markets for fixed and/or mobile telecommunications in the countries where the parties to the transaction operate.

In several cases of this type the Commission found that the transactions would not harm competition and the mergers were cleared without commitments. Examples include France Télécom/Mid Europa Partners/One (2007) and Deutsche Telekom/OTE (2008).

Sources:

European Commission: Deutsche Telekom/OTE, October 2008 [and](#)
European Commission: France Telecom/Mid Europa Partners/ONE, September 2007 with a third case in 2005 mentioned at http://ec.europa.eu/competition/sectors/telecommunications/mobile_en.html)

Analysing Acquisitions

There is no difference between mergers and acquisitions in terms of regulation.

ENDNOTES

[1] Cost savings from horizontal mergers may come from combining complementary assets, eliminating duplication of activities and achieving scale economies.

[2] From EU Guidelines on the assessment of horizontal mergers

[3] If both organisations have market power, successive (double) mark ups will increase the final price and lower output. The stronger their market power in their respective markets, the bigger the mark ups are and the greater the potential to lower them through a vertical merger. See the US contribution to the OECD Roundtable on Vertical Mergers, in February 2007
<http://www.ftc.gov/bc/international/docs/07RoundtableonVerticalMergers.pdf>

2.4.2 Joint Ventures

Joint ventures can have many different objectives, and have different implications for competition. Telecommunications joint ventures raise three broad types of competition concern:

- The potential for collusion among the parties in the joint venture,
- A loss of potential competition, and
- The potential for market exclusion and access discrimination.

Joint ventures with the purpose of fixing prices, restricting output, or allocating markets between firms reduce competition, and generally should not be permitted. Regulators or competition authorities should consider whether the joint venture will increase market power sufficiently to cause a substantial lessening of competition. Will the joint venture lead to an increase in prices or a reduction in output?

Box 2.14: Collusion in Spain and Portugal

The EU prohibits agreements and concerted practices which may affect trade and have as their object or effect the prevention or restriction of competition (Article 101) – in Europe. Telefónica and Portugal Telecom concluded a co-operation agreement in 1997 concerning markets outside the EU, which was notified to the Commission at the time.

In 2010, Telefónica acquired sole control over the Brazilian mobile operator Vivo from Portugal Telecom. That agreement suggests that Telefónica and Portugal Telecom will not compete with each other in their respective home markets. The Commission has a copy of the agreement and of the non-compete clause, which runs from September 2010 to the end of 2011.

In January 2011, the European Commission opened an investigation into this agreement including the scope and effects of the co-operation between the parties in Spain and Portugal prior to the 2010 Vivo transaction.

Source: EU Commission, Press Release, 24 January 2011 <http://europa.eu/rapid/pressReleasesAction.do?reference=IP/11/58&format=HTML&aged=0&language=EN&guiLanguage=en>

In some cases joint ventures include an agreement for the parties to acquire assets or voting rights in their respective firms. This type of arrangement is more durable than a conventional joint venture, and so requires additional scrutiny. The investigation should consider factors such as:

- The level of competition in the relevant [market](#)
- The number and power of competitors in the relevant market,
- The [market power](#) of the parties in the joint venture,
- The background of, and the relationship among, the parties in the joint venture,
- The setting in which the joint venture was created,
- The relationship between the lines of commerce of the joint venture and of the individual parties in the joint venture.

Ultimately, regardless of the benefits they produce for the collaborating parties, joint ventures must deliver consumer benefits and limited (in both duration and scope) integration in order to enhance the public interest.

3 Access to Customers and Facilities

The previous section discussed the conduct issues arising from market power. In this section, we discuss how the major source of market power can be countered through access policies.

[Market power](#) can be earned (eg by superior service or patented innovation) but in communications it often comes from control of an [essential facility](#). Typically, the incumbent has a legacy access network which it is uneconomic to duplicate and for which there are no close substitutes (ie a natural monopoly). This market power is removed with mandated [open access](#).

Specifically, this section will address:

- [Policy Issues](#)
- [Key Concepts](#)
- [Interconnection](#)
- [Unbundling](#)
- [Infrastructure Sharing](#)

[Section 4](#) will look at the important question of the price for access.

3.1 Policy Issues

The regulatory approach to [open access](#) has [evolved](#) as competitive business models have changed. Changes in technology have been a major catalyst for these changes. The deployment of next generation fixed and mobile access networks (NGNs) creates opportunities for cost savings and the creation of new services. It also creates challenges for traditional business models and for regulation.

In fixed networks, many incumbents are replacing copper with fibre to the street cabinet (FTTC) and then using VDSL technology over the copper sub-loop between the street cabinet and the customer's premises. Other operators, where the network architecture does not support this model, are planning for fibre to the home (FTTH). These NGN access models will result in a completely different local network architecture, where the 'central office' or 'main distribution frame' will eventually cease to exist.

Ideally, competition should extend to competing infrastructure investments. But where there is a natural monopoly in the provision of, say, a fixed customer access network it is uneconomic and unreasonable to expect duplication of such a network. The object of regulated access is to make such 'essential' or 'bottle-neck' facilities available to stimulate competition.

In the next two sub-sections, we explore how the focus of access policies has shifted with the evolution of competition (also discussed in more detail at [section 1.5.1](#)) and the emergence of digital communications.

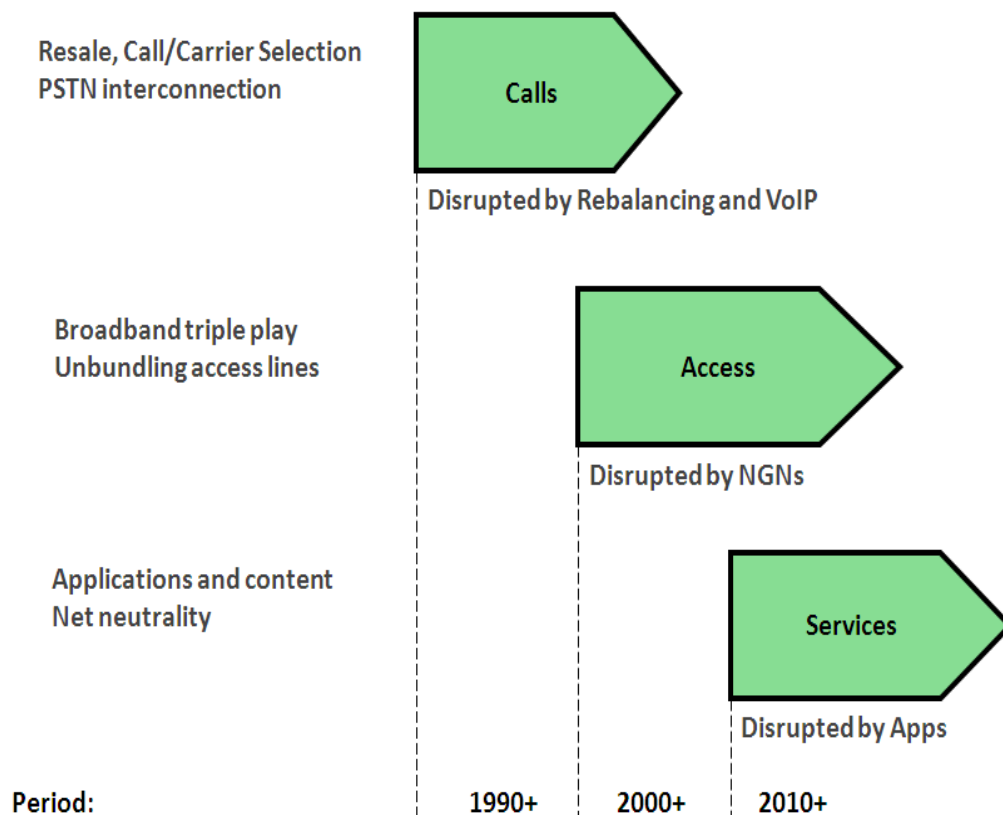
- [Evolution of competition](#)
- [IP interconnection](#)

Policy issues include infrastructure versus service competition, **universal service** ([Module 4](#)) and affordability.

3.1.1 Evolution of competition

Competitive business models and the focus of regulation continually evolve:

Figure 3.1: Evolution of Competition and Regulation



Three distinct phases are identified [1]:

- **Calls:** When developed country fixed markets were liberalised in the early 1990s, incumbent pricing structures relied on subsidising take-up of fixed lines with high call tariffs; particularly for long-distance and international calls. Call markets were opened with Call Selection (dial a pre-fix to use a new entrant) and/or Carrier Pre-selection (all long-distance calls are automatically routed through the chosen service provider).

Box 3.1: Call Selection in Bahrain

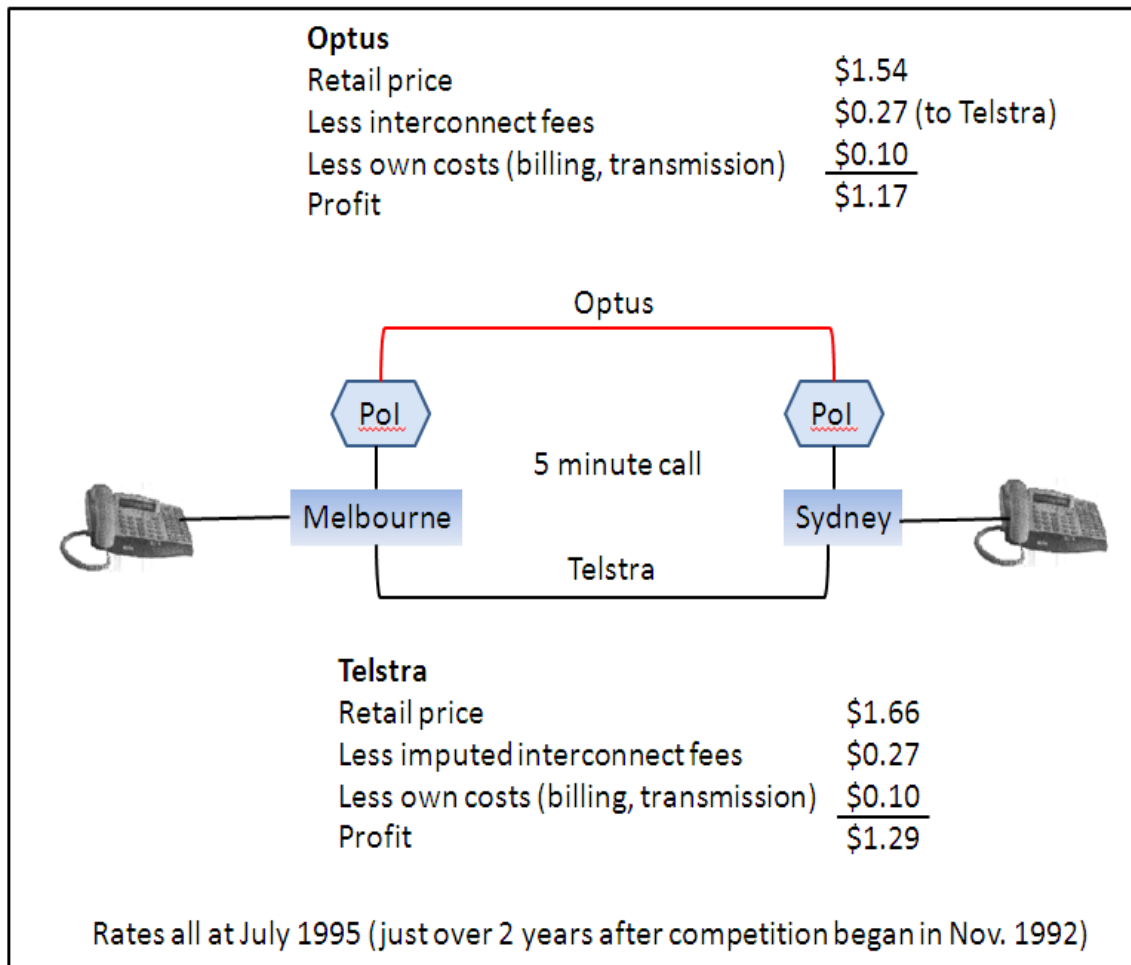
Bahrain introduced Call Selection (8-digit call over-ride) in 2004 and then carrier pre-selection (CPS or dial-tone) access for calls. These were introduced at considerable cost to provide customers with greater choice and convenience in the selection of which operator should bill them for calls. But, according to the TRA, although five operators offered CPS services, less than 1,000 of the 195,000 fixed lines subscribed to CPS (representing 1.2 per cent and 0.3 per cent of business and residential lines respectively).

Source: Bahrain, TRA, Strategic and Retail Market Review, August 2007

http://www.tra.org.bh/en/pdf/Strategic_and_Retail_Market_Review_Consultation_Final.pdf

Regulation in this era consisted of mandating Call and/or Carrier Selection and setting origination and terminating interconnection rates paid to the incumbent. These could be significantly lower than retail rates providing a significant margin for profit; as shown in Figure 3.2).

Figure 3.2: Call Selection in Australia



Regulators spent a great deal of time on developing and setting interconnection rates and arbitrating access [disputes](#) and customer switching issues.

The calls-based competitive business model was disrupted by regulator-assisted rebalancing of line rentals and call tariffs, take-up of unbundled local loop and broadband enabled VoIP which reduced margins on long distance call services.

This form of market liberalisation has not been successful in developing countries because fixed networks present a smaller market opportunity than mobile networks and the margins between regulated fixed network interconnection rates and retail prices have been small. Rather than spending time on implementing fixed call selection on copper with a high non-adoption risk, regulators in developing countries should focus on prohibiting either fixed or mobile carriers blocking or degrading competing digital apps like VoIP [2].

- **Access:** The advent of broadband and VoIP services shifted the focus of competition to control of the access line and consequently all services provided over it. The fight for control of the access line led to major players launching triple play (bundling voice, broadband and IPTV services) or even quadruple play (adding mobiles as part of the package).

The focus of regulation shifted from interconnection to [unbundling](#) of part of all of the copper line. A key policy issue is preserving investment incentives with unbundled access pricing. Forcing open access [3] to incumbent copper access networks to create competition has worked in developed countries but it made incumbents reluctant to invest in major civil works programmes to replace the copper access network with optical fibre partially (FTTN) or completely (FTTH).

Deployment of NGNs raises complex challenges on how to maintain access for all competitors.

Many incumbents are rolling out fibre to the node at the street cabinet (FTTN) and then using VDSL technology over the copper sub-loop between the street cabinet and the customer's premises. Other operators, where the network architecture does not support this model, are planning for fibre to the home (FTTH; removing all copper from the access network).

Box 3.2: Relative costs of different fibre NGNs

The fixed costs below are for items such as new street cabinets which do not vary with take-up. The variable costs are those that increase with the addition of each new line, and so include costs for active equipment and the final fibre connection to the premises which are only installed when a premises migrates to the new network. It can be seen that for all technologies the fixed costs associated with coverage are dominant, at over 70% of the total costs. The large proportion of fixed costs means that the costs per premises connected are particularly sensitive to the take-up assumptions.

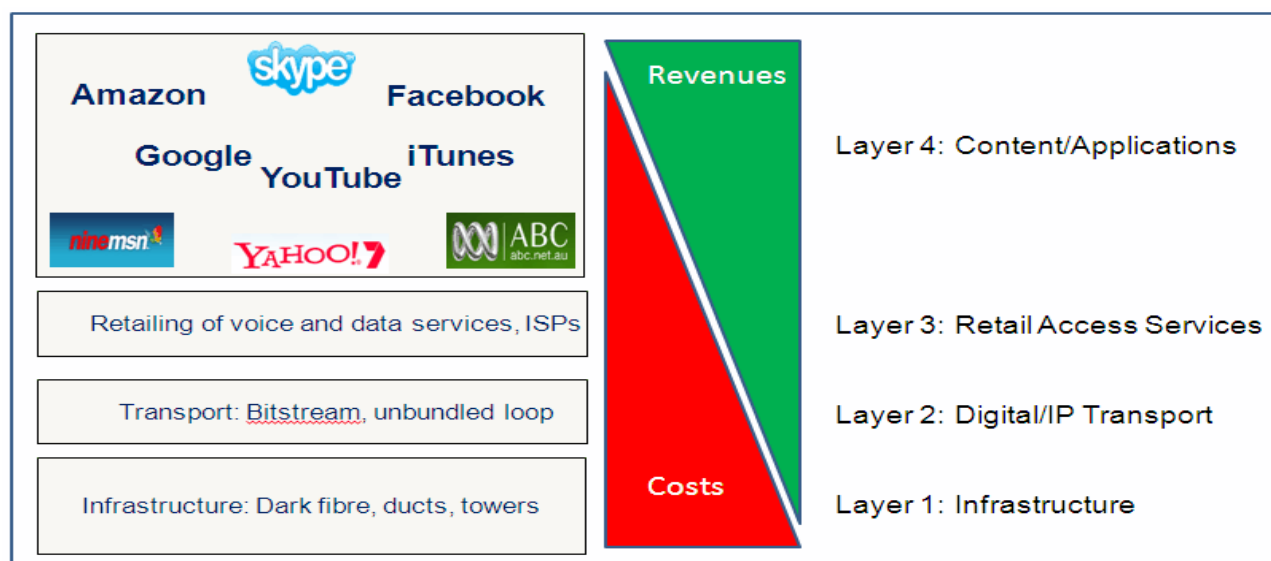
Source: Figure 1.7, The costs of deploying fibre-based next-generation broadband infrastructure, Analysys-Mason for Broadband Stakeholders Group, September 2008
http://www.broadbanduk.org/component/option,com_docman/task,doc_view/gid,1036/

According to the BSG report (Box 3.2), the costs of deploying FTTC/VDSL (fibre to the curb with VDSL from the node at the curb) in the UK are around GBP5.1 billion. This is around a fifth of the costs of deploying FTTH/GPON (GBP24.5 billion where GPON shares the fibre infrastructure at the node with around 32 homes), with FTTH/PTP costing around GBP28.8 billion (point-to-point costs 18% more than FTTH/GPON, but regulators like PTP fibre because it can be unbundled like copper).

The assumption of business models in the access competition era was that control of customer access also controlled revenues delivered over that infrastructure. With digitisation this assumption no longer holds leading to the era of service competition (eg from Skype).

- **Services:** The [de-layering](#) of the industry that has arrived with IP has broken the nexus between carriage and content. None of the content providers at layer 4 in the figure below need to deal with the providers at the other levels.

Figure 3.3: Revenues and Costs



With the shift of competition towards services on both fixed and mobile networks, the focus of regulation is on identifying new sources of market power and addressing new issues such as [network neutrality](#) and content regulation.

Broadcasting rights vary from country to country and even within countries. These rights govern the distribution of copyrighted content and media and allow the sole distribution of that content at any one time [4].

Broadcast television and telecommunications have been regulated differently. As IPTV allows broadcasting over IP networks new regulatory issues arise [5].

Box 3.3: Canada and Video Regulation

Netflix, based in California, began offering unlimited movie downloads in Canada for \$7.99 a month in 2010. By August 2011, the service had signed up 10% of the broadband households; a feat that took six years in the United States.

Cable and satellite companies in Canada argue that Internet-based movie distributors like Netflix should fund Canadian broadcast content and face other regulations that cable and satellite distributors such as Rogers Communications Inc. must meet.

But in October 2011, the Canadian Radio-television Telecommunications Commission (CRTC) decided against regulating online-streaming companies such as Netflix Inc. that provide television and feature films over the Internet; noting there isn't "any clear evidence" that so-called over-the-top services (OTT) are negatively affecting the broadcast system.

Source: Results of the fact-finding exercise on the over-the-top programming services, CRTC, October 2011 <http://www.crtc.gc.ca/eng/publications/reports/rp1110.pdf> and the Financial Post <http://www.nationalpost.com/news/Netflix+face+Canadian+regulations/5487301/story.html>

As an example of how technology can over-take regulation, copyright law often exempts copying for personal use and new technology has been used to stretch this permission to deliver services beyond what might have been anticipated (Box 3.4).

Box 3.4: Copyright for content

In Australia a mobile operator, Optus, has a cloud-storage service which enables customers to playback any of 15 free-to-air programs. It gives its mobile customers 45 minutes of free viewing for what it claims is just a time-shifting and format-shifting service. Optus argues that what it offers is equivalent to customers recording the content on their own hard drives for personal use, which does not breach copyright.

Key sporting organisations are concerned about the impact on revenues. The main mobile network operated by Telstra paid A\$153m for the rights to stream matches live over the Internet over five years.

The same issue arose in the USA in 2006 when US pay TV operator Cablevision introduced a service that allowed customers to record, pause, and replay television content from servers located in Cablevision data centres rather than from hard drives in their living rooms.

Cablevision was challenged by Twentieth Century Fox and, in March 2007, a district court found in favour of the copyright owner but this decision was reversed in August 2008 by the Second Circuit Court of Appeal.

Source: http://en.wikipedia.org/wiki/Cartoon_Network_LP_v._CSC_Holdings,_Inc.

END NOTES

[1] See also [section 1.5.1](#) for more detail on the evolution of the competition from calls to access in the context of the “ladder of investment”.

[2] See Rood H. and Abdulaziz H., Carrier Selection in Developing Countries: Dead on Arrival?, Telecommunications Policy Research Conference September, 2011 http://www.tprcweb.com/index.php?option=com_content&view=article&id=209&Itemid=60

[3] Open-access networks can generally be defined as those that provide services to all interested parties on an equal basis, that is, offering the same products at the same prices (and terms and conditions) to all operators, and provisioned by the same processes.

[4] An example of content only being aired in certain countries is BBC iPlayer. The BBC checks a user's IP address to make sure that only users located in the UK can stream content from the BBC. The BBC only allows free use of their product for users within the UK as those users have paid for a television license that funds part of the BBC. This IP address check is not fool-proof as the user may be accessing the BBC website through a VPN.

[5] Professor Eli M. Noam highlights some of the key challenges to sector specific regulation due to convergence in his report "TV or Not TV: Three Screens, One Regulation?"

3.1.2 IP Interconnection

All next generation networks (NGNs) will be digital and existing fixed and mobile switched networks are migrating quickly to digital networks. So, switched interconnection is giving way to IP interconnection as networks become digital. The paradigms ruling each of these currently are very different (Table 3.4).

Table 3.4: Comparison of Legacy (PSTN) and Next Generation (IP) Networks

Switched (Telephony) Networks	Next Generation (IP) Networks
Circuits dimensioned for voice	Traffic types vary (different QOS needed)
Interconnection fee based on time	Packets have no time or distance dimensions
Fixed – Mobile interconnection asymmetric	Packets exchanged uniformly across platforms
Small but constant information delivery rate	Typically “ <u>bursty</u> ” traffic patterns
Little tolerance for delays and sound distortions	Handle time sensitive and delay tolerant traffic
Regulated interconnection at agreed POIs	Unregulated peering and transit
Traffic routed over a circuit to a dialed number	Connectionless, ‘best efforts’ routed on IP headers

The good news for regulators is that IP interconnection removes the bottleneck in access. With switched networks, the access provider has a monopoly over the origination/termination of calls from/to customers on its fixed or mobile access network. With peering and transit, the access network does not have such control and there is no need to regulate; as shown in **Poland** (Box 3.5). Access regimes for switched telephony (PSTN) networks have been highly regulated while the [peering and transit](#) arrangements associated with the highly successful development of the internet are unregulated.

Box 3.5: Poland and IP interconnection.

In 2010, the European Commission determined that peering and transit arrangements are demand side substitutes which should consequently be viewed as part of the same [market](#). The case involved the Polish regulatory authority’s proposal to regulate these services as separate markets.

The incumbent (TP) does not peer with any ISP in Poland and is the only provider of transit into the global internet for half of the country where no competitor has coverage. However, small ISPs can indirectly convey traffic to both TP and the global internet via international Tier 1 carriers present at public internet exchange points in Poland. The different options used by local ISPs persuaded the EC that direct and indirect traffic to TP are functionally substitutable on the demand side.

Source: European Commission, Commission [Decision of 3 March 2010](#) _

Peering, also known as ‘Sender Keep All’ or ‘Bill and Keep’ is a zero compensation arrangement by which two ISPs agree to exchange traffic at no charge. Transit is an arrangement in which larger ISPs sell access to their networks, their customers, and other ISP networks with which they had negotiated access agreements.

Some argue that the peering and transit settlement regimes associated with the internet will not necessarily apply to all IP networks. They point out that although (managed) next generation networks (NGNs) and the (best-efforts) internet use IP as a common technology and are converging in the marketplace by offering similar or substitute services [1], they are organized differently and so remain separate and distinct, even though they share the same transmission infrastructure (such as fibre networks) [2]. That is, NGNs are a collection of ‘closed’ networks (i.e., packets are not allowed across the interconnection point unless

they are authorized).

To 'authorise' packets requires 'deep packet inspection' which may violate [network neutrality](#). For example, mobile operators who enjoy high termination rates for voice calls from fixed networks have blocked VoIP calls for which they receive no incremental revenue. This practice may become prohibited (see [Box 2.10](#) on KPN). This does not mean that with IP interconnection, a byte is a byte whatever it contains. It would not violate net neutrality to offer QOS on different types of traffic [3] and this would advantage carrier-grade IP networks over 'best efforts', '[over-the-top](#)' internet applications.

There is a regulatory issue with the transition from switched interconnection to IP interconnection because the different regimes offer arbitrage opportunities. But the arbitrage window between, say, fixed-to-mobile termination and VoIP closes as the difference in costs narrows [4]. Some other transitional issues include:

- Where there are service providers relying on [call selection](#), they would get a windfall from not having to pay termination fees while network operators would lose termination revenue; unless fees for originating access are increased.
- If there is significant traffic with countries that continue to use CPNP, the operators in those countries will continue to enjoy termination revenues while the operators in BAK regimes do not; which means BAK provides a subsidy to the CPNP country.
- The speed at which terminating rates can be reduced under the CPNP regime before the step to BAK is made.

Since network operators cannot expect to make money from switched interconnection when they move to IP Interconnection, they have to remove cross-subsidy between high margin calls and low margin line rentals and move towards volume based charging (probably implemented as monthly data caps).

END NOTES

[1] For example, IPTV and internet television are not the same; see [section 5.2](#).

[2] See the TMG's Broadband Strategies Handbook, 2011 report for the ITU

[3] NBN Co. the Australian wholesale broadband network offers four traffic classes: 1 (voice), 2 (interactive video), 3 (transactional data) and 4 (best-efforts). Table 2.7, NBN Co. Product and Pricing Overview for Access Seekers, Dec 2010 <http://www.nbnco.com.au/assets/documents/product-and-pricing-overview-dec-10.pdf>

[4] Theoretically, BAK could be subject to a variant of [refiling](#) if the calling party rings a service provider's call-back number and then is connected to the called party so that the service provider does not pay terminating fees at either end of the call. This does not seem to be an issue in countries like the USA where BAK exists because the (called) Receiving Party Pays. In the IP Interconnection context, the called party pays only retail broadband charges.

3.2 Key Concepts

The vocabulary of access regulation is shifting with the move from switched to IP interconnection. Between these, unbundling became important.

In the switched interconnection world, key concepts include:

- [Originating and terminating access](#) – This refers to exchange of voice traffic and the interconnection rates are usually timed.
- [Fixed-mobile termination](#) – The rates for terminating calls on mobile networks have been high, encouraging the growth of mobiles, but are being reduced quickly to facilitate the transition to [IP Interconnection](#).
- [Call selection and carrier pre-selection](#) – These were used to provide call services to the incumbent's customers. They are being replaced by unbundled copper loop and by apps on digital networks.
- [Number portability](#) – This can be mandated for either fixed and/or mobile numbers to reduce barriers to switching providers. Numbering plans are being reconsidered with VoIP services.
- **Points of interconnect** – These are the physical locations where traffic aggregated from either exchange service or fibre serving areas is exchanged between the owner of the access network and the providers of services to the customers in those areas.
- [Resale](#) – This is an extreme form of mandated access in which the incumbent operator is required to allow others to resell its services under their own brands. It is important part of the switched interconnection world because reselling retail access allows entrants to provide 'full service'.

As competition [evolved](#) from calls to access, new concepts emerged such as,

- [Full and partial unbundling of the copper local loop](#)
- [Infrastructure sharing](#) - Co-location and facilities access takes a number of forms.
- **Inter-modal or platform competition** – the USA relied on competition between cable and telephone networks. There is some evidence that wireless and mobile broadband networks could provide competition for fixed networks.

And, with the migration to all digital networks, came:

- [Next generation networks \(NGNs\)](#)
- [Bitstream access and dark fibre](#)
- [Peering and transit](#) - Peering, also known as 'Sender Keeps All' or 'Bill and Keep' is a zero compensation arrangement by which two ISPs agree to exchange traffic at no charge. Transit is an arrangement in which larger ISPs sell access to their networks, their customers, and other ISP networks with which they had negotiated access agreements.
- **Internet exchange points (IXPs)** – these are physical locations where several ISPs and content providers can exchange traffic more cheaply than paying transit fees [1].
- [IP interconnection](#)
- [Net neutrality](#)
- [Applications](#) (Apps)

Across all these stages, there are some constant principles and concepts such as:

- **Essential or bottleneck facilities** - are network elements or services that are provided exclusively or predominantly by a monopolist and are critical inputs to retail service. Also, it is not feasible, either economically or technologically, for retail competitors to duplicate the essential facility or develop a substitute for it.
- **Open access** - defined by InfoDev as *"the creation of competition in all layers of the network, allowing a wide variety of physical networks and applications to interact in an open architecture. Simply put, anyone can connect to anyone in a technology-neutral framework that encourages innovative, low-cost delivery to users. It encourages market entry from smaller, local companies and seeks to prevent any single entity from becoming dominant. Open access requires transparency to ensure fair trading within and between the layers, based on clear, comparative information on market prices and services."* [Spintrack AB. 2005. Open Access Models: Options for Improving Backbone Access in Developing Countries, for infoDev/World Bank. <http://www.infodev.org/en/Publication.10.html>]
- **Reference interconnection offer (RIO)**- this defines the price and non-price terms of the services for access or [interconnection](#) with the expectation that this will minimise [disputes](#).

END NOTES

[1] The economics of establishing an IXP are explained at <http://drpeering.net/white-papers/Modeling-the-value-of-an-Internet-Exchange-Point.html>

3.3 Interconnection

Interconnection is what allows users on each network to communicate with users on any other network. One of the ITU's most notable achievement has been the agreement of standards that allows a seamless, global telephone network. International two-way interconnection to allow exchange of traffic is relatively easy to achieve as there are mutual benefits.

Box 3.6: The World Trade Organization: Definition of 'Interconnection'

The WTO Reference Paper defines "interconnection" as: *"linking with suppliers providing public telecommunications transport networks or services in order to allow the users of one supplier to communicate with users of another supplier and to access services provided by another supplier, where specific commitments are undertaken."*

Source: Section 2, WTO Regulatory Reference Paper being the Annex to the Fourth Protocol to the GATS Agreement, the "Agreement on Basic Telecommunications", February 1997, in effect on 1 January 1998. [World Trade Organization - Reference Paper](#)

Interconnection can be cooperative (eg calls between countries) or competitive. In the case of competitive interconnection, incumbents provide originating and/or terminating interconnection which they are reluctant to do because it is a 'zero-sum' game: new entrants make money at the expense of the incumbent.

Telecommunications operators will interconnect voluntarily in some circumstances. If two operators are not in direct competition with each other, then generally they will have an incentive to interconnect. This is because interconnection increases the value of a network to subscribers by increasing the number of people they can call and the range of ICT services they can access.

Regulators become involved where incumbent operators have little incentive to allow access to their network, or to allow access on reasonable terms. Where the interconnection seeker is a potential competitor, an incumbent may seek to limit competition, and preserve its market power, by:

- Refusing to interconnect
- Offering interconnection at a price, or on other terms, that make it difficult for an efficient entrant to compete, or
- Seeking to 'sabotage' the entrant by providing a lower quality interconnection service to the entrant than the incumbent provides itself.

In these cases regulatory intervention can lead to a more efficient outcome. The motivation for interconnection regulation is that efficient competition in downstream markets would be difficult, or even impossible, unless entrants can access the incumbent's network at appropriate prices, terms and conditions.

Interconnection regulation can apply equally to all telecommunications carriers (symmetric regulation) or to incumbent carriers only (asymmetric regulation). However, the need for asymmetric regulation should be kept under regular review. As market conditions change, new firms enter the market and new competitive services emerge, market power can be eroded. Where this occurs, regulators need to reconsider the justification for asymmetric regulation and, if market power is no longer a concern, remove the additional requirements.

Price differences between regulated and unregulated interconnection services result in arbitrage opportunities

and potential market distortions.

With new networks (both fixed and mobile) based on Internet Protocols (IP), switched interconnection is becoming a thing of the past. IP interconnection is becoming the new standard; although the rules have not yet been agreed.

3.3.1 Forms of Interconnection

One-way interconnection occurs when payment goes only one-way (eg when rail operators seek access to rail networks). Two-way interconnection occurs with reciprocal payments (eg between networks with customers who communicate across networks). One-way and two-way interconnection can co-exist. For example, new entrants often obtain parts of their networks from the incumbent carrier (one-way interconnection), and then exchange traffic with the incumbent (two-way interconnection). There are several approaches to structuring interconnection payments which are discussed at [4.3](#)

The distinction between one-way and two-way interconnection is less important than whether the parties concerned compete or cooperate.

International calls between countries do not compete with each other (subject to arbitrage). The accounting rate system was developed as a way to allocate revenue for international telephone services. The system is a series of arrangements between national operators in which the operators jointly provide international calls and divide the revenues from such calls between them.

For many less-developed countries, traffic on international routes is unbalanced — more calls are terminated in these countries than originate from them. As a result, the accounting rate system produced considerable revenue inflows to many less-developed countries. This regime has been undermined by markets and regulation. Carriers exploit numerous arbitrage opportunities to offer customers rates that are well below international accounting rates. The system has also come under regulatory pressure [1].

The accounting rate system has now been largely replaced by cross-border interconnection. Carriers directly negotiate rates to terminate traffic, in some cases with long-term contracts, in other cases on a short-term or spot basis [2].

END NOTES

- [1] In 1997, the United States Federal Communications Commission acted to reduce accounting rates by prohibiting United States-based carriers from paying rates above certain benchmark levels.
- [2] Electronic exchanges have emerged that enable trading of international voice, data, and mobile capacity. [Arbinet](#) is an example of such an exchange.

3.3.2 Interconnection Agreements and Dispute Resolution

Often a regulator will require the development of a Reference Interconnection Offer (RIO) as part of opening the sector to competition. The RIO sets out the terms and conditions for interconnection services that a competing operator can choose to accept without further negotiations. The purpose of the RIO is to avoid disputes and to shorten the entry time for a new competitor. Or, a regulatory tool that accomplishes similar results is a ‘most favoured nation’ or non-discrimination requirement, whereby any operator can choose to accept the terms and conditions that have previously been agreed or ordered to be in place for another competitor. Many countries have adopted either or both of these measures. One example is described in the [practice note on Jamaica's RIO](#).

However, disputes about access and interconnection are common in the telecommunications sector. Reliance on the courts to resolve disputes between telecommunications firms is costly and can involve substantial delays. Without a mechanism to resolve interconnection disputes quickly and effectively, innovation and competition in the sector will be threatened. Entrants will not commit resources unless they have confidence that their business will be viable and that they will be able to resolve any disputes in a timely fashion.

Table 3.5: Techniques for Dispute Resolution

Advantages	Technique	Disadvantages
Flexible, consensual, encourages parties to find common interests and 'win-win' solutions	Negotiation & Mediation	A party to the dispute may delay an expected adverse resolution
Confidentiality, legally enforceable, quicker than alternatives	Arbitration	
Structured process Subject to review	Regulatory Adjudication	Delay 'gaming' of the process Lack of expertise in regulator
Finality and enforceability	Court Adjudication	Cost, time, and lack of telecoms expertise

Source: ITU, Dispute Resolution in the Telecommunications Sector: Current Practices and Future Directions </en/Publication.3032.html>

The [World Trade Organization - Reference Paper](#) includes obligations relating to dispute resolution. Under the Agreement, Member countries must establish an independent domestic dispute resolution body, so that interconnection disputes can be settled within a reasonable period of time. This need not be the regulator, but it often is.

Dispute resolution presents a number of challenges for regulators, including:

- **Access to information:** Operators usually have better information than the regulator on the details of interconnection disputes. This makes it difficult for the regulator to come to a decision and be confident that it is the best one.
- **'Gaming' of the process:** Either party may engage in anti-competitive gaming of the dispute resolution process. For example, an incumbent may use delaying tactics to draw out the proceedings, in order to delay competitive entry. Or an entrant may not accept a reasonable interconnection offer from the incumbent if it believes that it can persuade the regulator (or dispute resolution authority) to mandate more favourable terms.
- **Capacity:** Many countries face a shortage of people with the necessary legal, economic, and technical expertise to resolve interconnection disputes.

There are several ways of tackling these challenges such as:

- **Improve information available to the regulator** – to enable the regulator to base its decision on better information.
 - o Ask parties to define areas of agreement and dispute and to provide information to clarify disputed issues;
 - o Require written submissions from operators on areas of dispute, supported by facts and research if necessary; and
 - o Allow others (for example customer groups and other service providers) to comment on areas of dispute.
- **Obtain expert assistance** – to supplement the regulator's in-house capability by drawing on external expertise.
 - o Use external advisors (for example an experienced interconnection expert) to assist in resolving the dispute. The expert's role could include clarifying areas of agreement and dispute, identifying

information needs, and providing advice.

- o Consider appointing an independent mediator (or, if the parties agree, an arbitrator).
- o Consult with other regulators on their approach in similar cases.
- o Review decisions and interconnection agreements approved by other regulators.
- o Use outside parties for informal mediation, arbitration, information gathering or other assistance.
This can be particularly useful in countries where the regulator lacks the legal authority to resolve the dispute

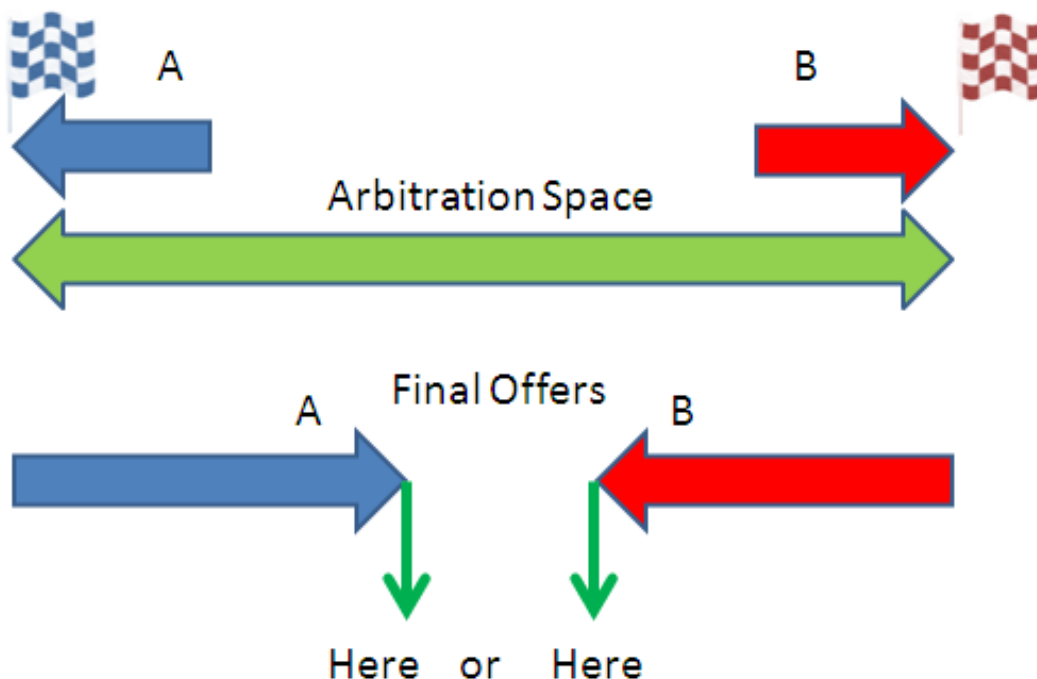
· **Improve transparency** – making more information publicly available should cause parties to consider their positions more carefully.

- o Make parties' submissions available for comment by other parties and the public, with summaries to protect confidential information; and
- o Publish a draft decision and give parties to the dispute and others an opportunity to make written submissions on it.

The problem with 'negotiate/arbitrate' regimes is that the two parties to the dispute exaggerate their differences hoping to draw any middle ground resolution towards their end of the arbitration spectrum. The problems with this for the regulator were discussed above. The solutions above still require the regulator to find the right spot on the arbitration spectrum to set a price; and they take time and are costly.

The Australian response to these problems was to dump the negotiate/arbitrate framework in 2011 [1]. The regulator (the ACCC) now has to set prices for all regulated ('declared') access services. It still has to use its own resources to find the right spot on a spectrum which is not bounded by previous commercial negotiations. Its interim finding is subject to consultation before it issues a final set of prices.

Figure 3.4: Final Offer Arbitration



Another approach which solves some of the problems identified above and could work well for countries with limited resources is '**final offer arbitration**' (FOA) [PN]. The regulator lays down the criteria by which the final offer brought to each party will be judged and chooses one. There is no compromise between the proposals of the parties. The regulator does not have to build its own cost models or justify its choice. This provides powerful incentives for parties to reach agreement rather than risk the other's proposal being accepted

at arbitration. It also encourages each party to be reasonable and narrow their differences.

END NOTES

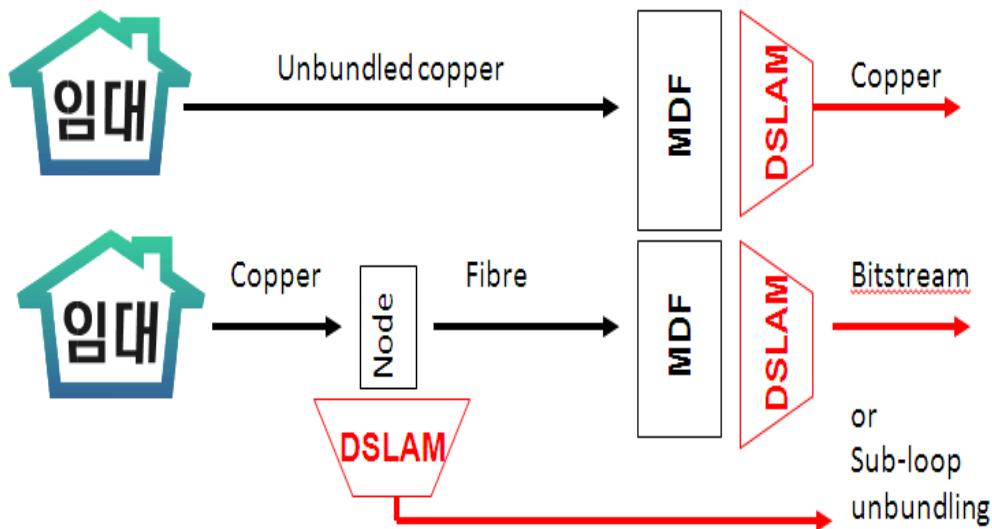
[1] The telecommunications access regime was amended with effect from 1 January 2011 by the Telecommunications Legislation Amendment (Competition and Consumer Safeguards) Act 2010 (CACS Act). The amendments replaced the previous negotiate/arbitrate framework with a range of different access mechanisms, including access determinations (ADs). An AD provides a base set of terms and conditions that access seekers can rely on if they are unable to reach agreement with an access provider on the terms and conditions of access to a declared service. If parties do come to an agreement on terms and conditions of access, their access agreement will prevail over the AD to the extent of any inconsistency. The amended regime requires the ACCC to make ADs for all declared services.

3.4 Unbundling

Unbundling requires the incumbent to allow entrants to lease certain individual building blocks that make up a telecommunications network. Unbundling can be an enormous task for regulators. The administrative costs of defining, and setting prices for, a range of network elements can be high. In addition, unbundling can impose high compliance costs on incumbent carriers. Regulators should carefully consider the merits of unbundling on a case-by-case basis, with a thorough assessment of the likely costs and benefits. The main forms of unbundling are:

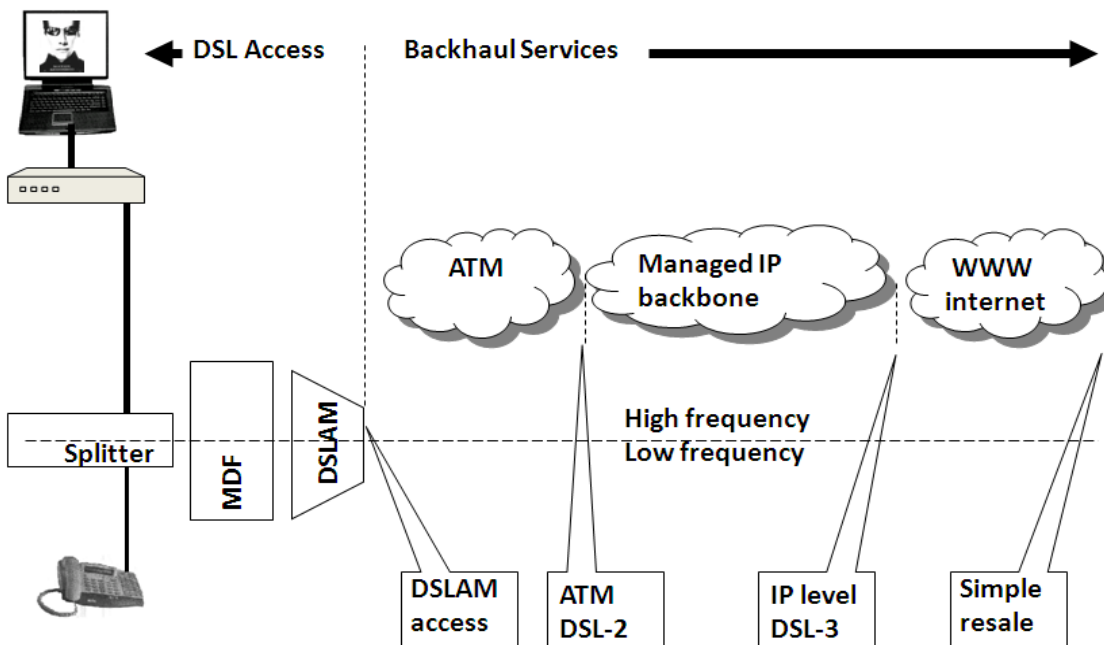
- o **Resale** is often mandated as the first rung on the ‘**ladder of investment**’ (1.5.1). Resale obligations require the vertically integrated firm to make its retail services available for resale by any competitor. This approach is used in many markets including the USA, UK and Australia.
- o **Leased lines** are an important access product through all stages of competition except service competition. They may be long-distance transmission links on ‘thin’ routes [1]. Or, they may be data ‘tails’ providing originating/terminating access for data services. These have tended to be displaced by unbundled local loop where the entrant has more control over the service specification.
- o **Line-sharing** (or partial line unbundling) where incumbent must provide access to the non-voice frequencies of a local loop and/or access to space within a main distribution frame where *DSLAMs* and similar types of equipment can be interconnected to the local loop. Where entrants use line sharing to provide broadband service, they can also buy resold local service (line rental and calls) to provide a more complete bundle of services.

Figure 3.5: Unbundled Copper Access



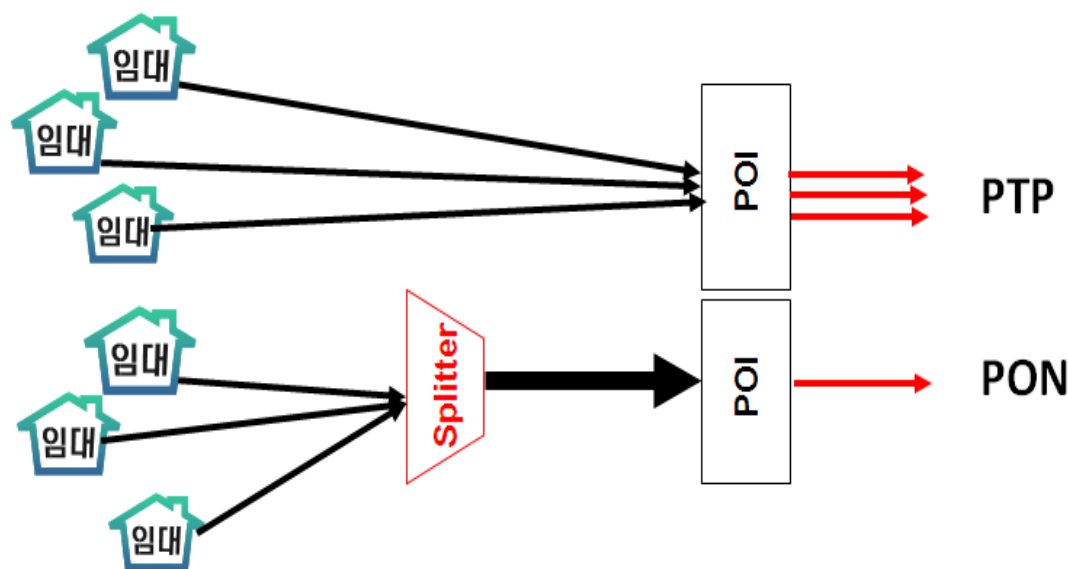
- o **Local loop unbundling** is also known as full unbundling and occurs when the raw (unconditioned) copper pair is used by the entrant to provide both voice and data services over ADSL).
- o **Sub-loop unbundling.** With FTTN, sub-loop copper between the node and the final customer may be mandated but it is unlikely to be commercially viable.
- o **Bitstream** access was used in New Zealand as an alternative way of unbundling copper lines. Where fibre replaces part of the copper access network (Fibre to the Node) or all of (Fibre to the Home), Bitstream is the most common form of unbundling in fibre networks. It can be at Layer 2 (ATM or Ethernet, in most fibre networks) or Layer 3 (IP, as with New Zealand's copper bitstream service).

Figure 3.6: Bitstream Access Options



- o **Dark fibre** (unlit optical fibre) is another form which may be constrained by the architecture of the FTTH access network (Figure 3.7). It is possible with point-to-point (PTP) fibre where there is one fibre for each end customer back to the point of interconnect (POI). But it is cheaper to build FTTH with a passive optical network (PON) in which a fibre line is connected to a passive optical splitter, which splits the incoming light from the POI over typically 32 (but up to 128) fibres going to end customers.

Figure 3.7: FTTH Design Options



- o **Wavelengths** are likely to be unbundled on PONs in future but the standards do not yet exist for this solution [2]. With wave length multiplexing (WDM), the end-user is accessed by using a separate wavelength f not shared by other users.

Box 3.7: New Zealand SLES dispute

Before unbundled local loop (ULL) was made available, entrants could buy unbundled bitstream access (UBA) and re-sell voice services (POTS, 'plain old telephone service') or buy UBA without POTS ('Naked' UBA; perhaps relying on their own VoIP or mobile service to provide voice). The Basic UBA price is \$20.66 but Naked UBA is \$44.59 per month where the difference ('uplift') is equal to the ULL price to cover loop costs (September 2011 prices). With ULL, entrants could provide their own voice and broadband services.

Telecom New Zealand (TNZ) is in the process of deploying fibre to the node ('cabinetisation'). Where this happens, copper is not available to provide broadband and POTS over ULL. The entrant has three options:

First: unbundling the sub-loop (SLU) at the cabinet and using their own or leased fibre backhaul ('sub-loop backhaul'; at about 60 per cent of ULL cost); but this is uneconomic with cabinets typically serving only 300-350 customers.

Second: basic UBA can be bought with resold POTS. The wholesale operator, Chorus, provides these from the cabinet to the exchange over fibre and copper respectively for entrants and Telstra Retail. When copper is no longer available, POTS will be carried over fibre.

Third: where copper between the cabinet and exchange has not been de-commissioned, it can be bought as the un-regulated (and unpublished) sub-loop extension service (SLES) which together with sub-

loop access provides a copper path for POTS. Naked UBA provides broadband. Entrants claimed that they should only pay the Basic UBA price or they would be paying contributions to the cost of the loop twice; unlike Telecom Retail.

The Commerce Commission agreed and noted that Telecom had breached its separation undertakings because option three did not provide access on the same terms as Telecom Retail. Because TNZ moved to address this issue promptly, the Commerce Commission agreed to limit compensation to NZ\$31.6m; the commercial gain it estimated TNZ to have made. This was distributed between the five new entrants affected.

Source: New Zealand, Commerce Commission Decision No. 731, Final Review of the Standard Terms Determination for the designated service Telecom's unbundled bitstream access, September 2011
<http://www.comcom.govt.nz/1st-competition-test-for-uba-std/>

Unbundling usually requires **facilities sharing** (3.5) or **collocation**, where the incumbent operator houses the communications equipment of competing operators to facilitate connectivity, or permits entrants to share infrastructure such as cell-site masts, cable ducts, or telephone poles.

Because unbundling copper has been so successful in stimulating competition, regulators have looked for fibre analogues to the unbundled local loop (ULL) and line sharing service (LSS) found in copper networks. Unbundling of copper loop is not easy with fibre-to-the-node (FTTN) and impossible with fibre-to-the-home (FTTH). Regulators are still struggling to determine both what access products are appropriate in the new environment and how they should be priced without discouraging further investment in next generation networks (NGNs).

Box 3.8: UK Approach to NGN Access Products

Ofcom's new regulatory model rests on the following core elements:

Virtual Unbundled Local Access ('VULA'), which will allow competitors to deliver services over BT's new NGA network, with a degree of control that is similar to that achieved when taking over the physical line to the customer;

Physical Infrastructure Access ('PIA'), which will allow competitors to deploy their own NGA infrastructure between the customer and the local exchange, using BT's duct and pole infrastructure, to provide broadband and telephony; and

Local Loop Unbundling ('LLU') which Ofcom expects will continue to provide a basis for competition in current (copper) generation services, allowing competitors to physically take over (or share) BT's copper lines between the customer and the local exchange.

Ofcom concluded that prices for LLU, PIA and SLU must be related to the cost of providing them. However, it decided **not** to regulate the prices of the product(s) that BT provides under its VULA obligation. It considered that this approach will give BT the flexibility to price its VULA services according to emerging information on the demand for, and supply costs of, NGA services. At the same time, the prices of these services will be constrained by the availability of current generation broadband services and by competition from services provided over cable TV network infrastructure.

Source: Review of the wholesale local access market – Statement, Ofcom, October 2010
<http://stakeholders.ofcom.org.uk/consultations/wla/statement>

In developing countries, unbundling copper is not a useful option for creating competition because copper

networks are not extensive. In developed countries, incumbents have been slow to roll-out fibre networks because they could not see a business case or they felt that regulated access prices would be too low. The fact that broadband is increasingly expected to be delivered over wireless networks in developing countries brings to question the importance of focussing on local loop unbundling where the copper local loop is less important relative to wireless penetration.

END NOTES

[1] Transmission is needed to carry voice or traffic collected at one ‘point-of-interconnect’ (POI) to another POI. ‘Thick’ routes carry a lot of traffic and may consequently be subject to infrastructure competition; in which case regulation of the incumbent may be relaxed. ‘Thin routes’ do not carry enough traffic to make a business case for investment.

[2] WDM is done for some transmission systems but the standards for assigning wavelengths to individuals in large-scale commercial deployments have not yet been agreed (BEREC, March 2010).

3.5 Infrastructure Sharing and Colocation

One of the most important policy concerns underlying the growing regulatory interest in sharing is the promotion of rapid and efficient network deployment. In many developing countries, the network in question is the mobile network, which is increasingly becoming the dominant form of infrastructure in these countries, as well as the backbone for the provision of universal access. In more developed and industrialized countries, the emphasis is on national broadband core and access networks and Next-Generation-Networks (NGNs). Although the modes of sharing differ and although each network raises particular policy concerns, broadly speaking, sharing facilitates a rapid, less costly and less disruptive deployment of networks, whether the network is mobile, fixed broadband, or NGN [1].

Sharing helps to address three obstacles to efficient and timely network deployment:

- the high costs of network roll-out;
- restricted access to bottleneck facilities and
- poor investment incentives, particularly in un-served or under-served areas.

Box 3.9: Vietnam

Due to competition in Vietnam's telecommunications market (there are around a dozen enterprises providing telecommunications infrastructure), providers have a common need in sharing, but sharing telecommunications infrastructure is difficult, leading to overlap in investment in the access network. This causes problems of wasted resources, difficulties for users, visual pollution, etc. There are too many businesses providing infrastructure development making it difficult for interconnection because every operator applies different technology. This does not lead to harmonization in national telecommunications infrastructure and is not sustainable to meet the development needs of the country in the future. The service providers are now trying to develop a shared co-operation network infrastructure but so far no specific measures have been implemented due to disagreement on the benefits as well as a lack of appropriate regulatory guidelines.

Source: Vietnam, Broadband in Vietnam: Forging Its Own Path, Tran Minh Truan, InfoDev, Nov 2011
<http://www.infodev.org/en/Publication.1127.html>

There is a distinction between passive and active infrastructure sharing:

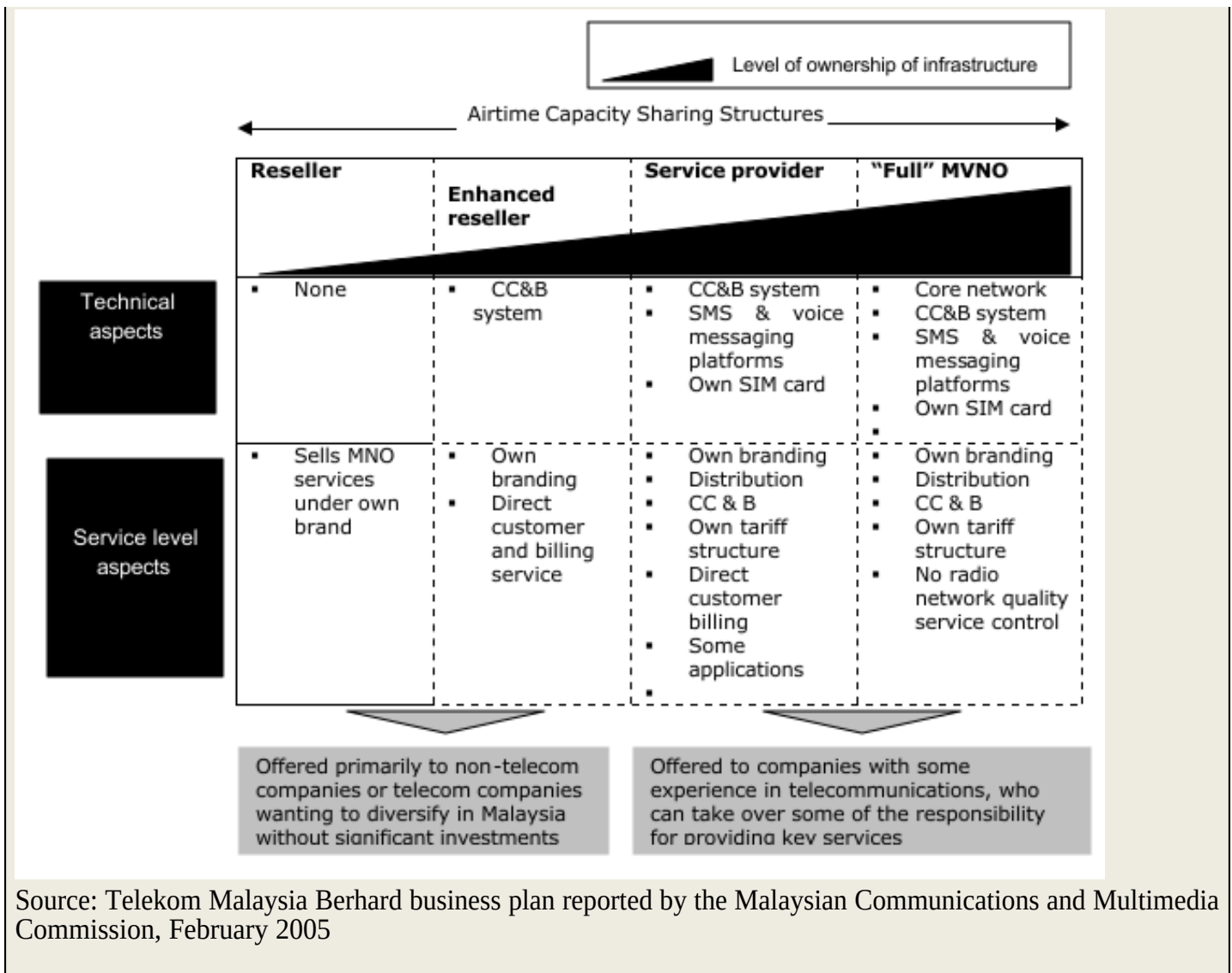
- Passive infrastructure includes all the civil engineering and non-electronic elements of infrastructure, such as physical sites, poles and ducts (and also power supplies).
- Active infrastructure covers all the electronic telecommunication elements of infrastructure like lit fibre, access node switches, and broadband remote access servers.

Infrastructure sharing is particularly important to the building of broadband networks where the cost of civil works (eg digging trenches) is significant. The Fibre-to-the-Home Council identifies four business models used in the FTTH market [2]:

1. Vertically integrated – one major player covering passive, active and service layers, who offers services directly to their customers, conveys traffic on their networking equipment and uses their own passive infrastructure (exclusively or with wholesale to other communications providers).
2. Passive sharing – in this model, the infrastructure owner deploys the passive infrastructure and provides passive access to other players, who concentrate on the active and service layers.
3. Active sharing – the vertical infrastructure provider deploys both active and passive infrastructure, and opens it up to service providers, with each service provider taking care of its base of subscribers.
4. Fully separated – in some countries the fully separated model has emerged, featuring an infrastructure owner, a network operator and a series of service providers.

Active infrastructure sharing can be a matter of degree. Mobile Virtual Network Operators (MVNOs) do not own their own spectrum but may rely to a greater or lesser extent on components provided by the incumbent.

Box 3.10: MVNO Options



The policy issues related to competition and sharing are complex. Sharing offers both the possibility of enhancing competition and the risk of hindering competition.

On the one hand, sharing policies can help to increase competition in the ICT sector. One of the greatest impediments to market entry in the sector is the cost of network deployment. Sharing allows operators to enter the market at a much lower cost than what they would encounter if they were required to construct their own network infrastructure. Sharing also helps to overcome barriers to competition such as the control of bottleneck facilities by dominant operators.

On the other hand, too much sharing undermines the incentives for investment in infrastructure-based competition. In the early days of liberalisation, some regulators prohibited facilities sharing. A very permissive sharing regime makes it possible for operators to become active without investing in their own infrastructure. If most operators rely on the same underlying infrastructure providers, it is likely that there will be little ultimate differentiation in their services. The benefits of competition like lower prices and consumer choice are reduced as a result.

Ultimately, there is an inevitable tension between the equally important goals of reducing barriers to market entry and stimulating investment in infrastructure. Both of these goals are relevant to maintaining healthy competition in the ICT sector. Striking the appropriate balance between these goals is a delicate matter for policy makers and regulators.

Box 3.11: India

In India the regulator, TRAI, proposed sharing rules for the mobile sector in 2007, both for active and passive components. Since then, Bharti Group, Vodafone Group, and Aditya Birla Telecom (Idea Cellular) have created Indus Towers, a joint venture that controls over 100,000 towers and provides passive infrastructure service to its shareholders and others.

In order to raise capital for 3G auctions and deployment, 2010 saw significant divestment of mobile towers to independent companies that operate them on an open access basis. For example, in January 2010 an Indian tower company, GTL Infrastructure, acquired 17,500 towers from Aircel, making GTL one of the largest independent tower companies in the world. GTL was subsequently in negotiations with Reliance Communications to acquire 50,000 additional towers, but those negotiations fell through in the middle of 2010.

But there are limits. India has 22 service areas with Bharti Airtel, Idea Cellular and Vodafone Group present in 13, 11 and 9 areas respectively. In July 2011 they made an agreement (in apparent breach of their licence conditions) to allow customers to roam across each other's networks. The TRAI was considering this matter in December 2011.

Source: TMG, Broadband Strategies report for ITU and <http://www.totaltele.com/view.aspx?ID=469845&mail=662&C=0>

END NOTES

[1] For a comprehensive discussion of infrastructure sharing in fixed and mobile networks, see 'Extending Open Access to National Fibre Backbones in Developing Countries' and 'Mobile Network Sharing' respectively. These formed the basis for longer discussion of this issue in the previous version of the toolkit.

[2] http://wiki.ftthcouncil.eu/index.php/FTTH_Handbook/Infrastructure_Sharing

4 Regulating Access Prices

The heart of regulation is regulating access prices. It is the key to new entrant business models. The previous section warned of regulatory over-reach on mandating access services because not all inputs are essential, bottle-neck input services so making them available will deter new investment. This section alerts regulators to how access pricing can shape competition.

The final column of Table 4.1 provides a mapping between the access products discussed in the previous section and the approaches to pricing them which are discussed in this section. The first two columns come from [Table 1.2](#) defining markets suitable for *ex-ante* regulation in the EU.

Table 4.1: Access Products and Pricing Options

Market	Service	Product	Pricing	Sections
1	Retail access to PSTN	Line rental (WLR) Local calls (LCS)	Retail Minus (RMAC), Benchmarking	3.6 + 4.6
2 + 3	PSTN originating and terminating access	POTA, IP interconnection	LRIC, BAK, Benchmarking	3.1.2 + 3.3 + 4.3
4	Wholesale network infrastructure access	Unbundled loop (ULL) Line sharing (LSS) Infrastructure sharing	LRIC, Benchmarking	3.4 + 4.4
5	Wholesale broadband access	Bitstream , Dark Fibre	LRIC, GB, Benchmarking	3.4 + 4.4
6	Wholesale leased lines	Data tails	LRIC, Benchmarking	3.4 + 4.4
7	Voice call termination on mobile networks	FTM	LRIC, BAK Benchmarking	6.4

Benchmarking is a pricing methodology that can (and has) been used for every service and is probably the most practical method for small developing countries.

In developed countries fundamental changes in the approach to access pricing are taking place with the transition to all digital networks. Developing countries have the opportunity to leap-frog legacy pricing approaches as the networks being built now are digital.

This section explores the following topics:

- [Policy Issues](#)
- [Key Concepts](#)
- [Pricing Interconnection](#)
- [Pricing Unbundled Access](#)
- [Pricing Infrastructure Sharing](#)
- [Pricing Resale](#)

4.1 Policy Issues

Mandating access usually [1] means that access prices have to be regulated too: the owner of the essential facility cannot use its market power to control supply because open access is mandated and regulated access pricing stops it using its market power to control the price.

In trying to support competitive processes, regulated access pricing seeks to achieve three forms of economic efficiency:

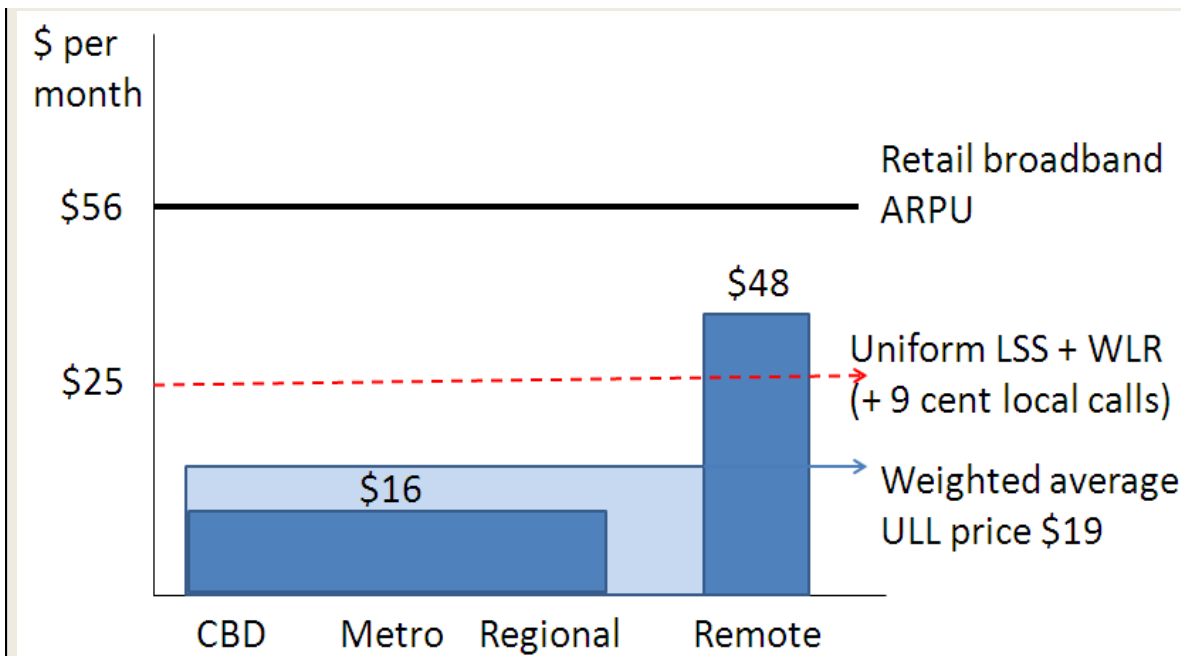
- **Allocative efficiency** requires that resources, products, and services are allocated to the person or persons who value them the most. For this to happen, consumers of final products or services (such as telephone calls to other customers) should pay prices that reflect the cost of the resources used to provide those products or services
- **Productive efficiency** requires that market participants use scarce resources as productively as possible. This means that the most efficient provider should not be precluded from serving customers, and
- **Dynamic efficiency** requires that all firms (entrants and incumbents) should have proper incentives to invest in technologies that reduce costs and/or expand product offerings.

It is unlikely that these can be achieved simultaneously. More importance has been given to dynamic efficiency as the policy focus has shifted from accommodating legacy issues associated with opening access to copper networks to encouraging investment in fibre networks.

In addition, there are social objectives. Historically, many incumbent operators have maintained high prices for long distance and international services, and used the proceeds to support below-cost prices for basic services. This was made possible by statutory monopoly and allowed the wide-spread adoption of affordable telephone service. However, with the introduction of competition for calls these cross-subsidies became unsustainable. Competitive pressures eroded long distance and international prices and regulated low prices for basic service became unsustainable.

Box 4.1: Geographic Cross Subsidy

Policy makers generally like uniform pricing; a social objective that conflicts with economic efficiency objectives. In Australia, Telstra argued that the ACCC was a ‘rogue regulator’ because it de-averaged unbundled local loop (ULL) prices across four regional types. Other access products like line sharing (LSS), wholesale line rental (WLR) and local calls are not de-averaged. This means that entrants can opt to use these instead of ULL in remote areas.



The presence of different access products reduces the ability to extract cross-subsidies.

When Telstra sought to build a metro-only FTTN, it was agreed that the access price for the new bitstream service should include a contribution to support telephony services to 1 million rural and remote customers. But the gap between the \$1.77 per month offered by the ACCC and the \$13.69 per month sought by Telstra was too big and the FTTN plan was dropped.

Source: ACCC [Final Decision](#) on Fixed Services, July 2011 and Telstra's FTTN Briefing, 7 August 2006

In the era of call competition, regulators had to rethink the justification for pricing policies aimed at keeping prices for basic service low and consider rebalancing tariffs to better reflect economic costs.

Among the policy challenges in moving to digital networks,

- the relative prices of wholesale services may affect the transition from copper to fibre and consistency among them is essential. Take-up of fibre access has been slow where it has to compete with copper access services which have low regulated prices
- off-setting the above, as users move off copper to fibre, cable and mobile services the unit costs of copper and consequently access prices increase; which raises affordability concerns for the users left on copper
- the migration to IP Interconnection raises transitional issues and there is no consensus yet on how to price digital interconnection

Fibre presents a new challenge for policy. Operators are facing potentially significant investment costs to upgrade existing infrastructure to keep up with technological change. However, revenues for new broadband services are uncertain and existing revenue streams are threatened by 'over-the-top' services. The most certain source of revenue is retail access pricing – and that is threatened by open access and increasingly capable mobile broadband.

Box 4.2: Asymmetric Risk Example

Suppose an operator is considering whether to build a FTTH access network in a particular region. Revenues are uncertain. If demand is strong, the network could generate profits of \$10m a year but if there is a lack of demand there will be annual losses of \$8m. If these cases are considered equally likely, the expected profit is \$1m and the investment will be made – if the operator has a monopoly.

	Probability	Monopoly	Open Access
Success	50%	+\$10m	+\$6m
Failure	50%	-\$8m	-\$8m
Expected		+\$1m	-\$1m

If, however, the network is successful and a new entrant gets access and takes 40 per cent of the market, the profits to our investor could be cut from \$10m to \$6m a year. The expected return is now minus \$1m a year – the investment is not profitable with open access. That is, the risk of open access can make a profitable and socially desirable investment unprofitable and it will not proceed.

Box 4.2 not theoretical. Private operators have been slow or reluctant to invest in broadband. In the USA, the FCC broke the impasse by forbearing to regulate broadband access [2] and the German and Australian incumbents unsuccessfully sought ‘access holidays’ long enough to get a return on their prospective investments [3].

The problem with ‘access holidays’ is that it gives the incumbent too much of a ‘first-mover’ advantage. That leaves the problem of how to set an access price for fibre networks that satisfies a number of objectives simultaneously:

1. It must provide a return on large investments
2. It must ensure that broadband access remains affordable to end users
3. It must provide affordable open access for wholesale customers
4. It must not foreclose investment (eg FTTH extensions to FTTN)
5. It must satisfy government social equity objectives (eg USO and uniform pricing)

Pricing for copper networks appeared to discourage investment in fibre access networks leading some regulators to seek new models for [pricing interconnection](#) .

END NOTES

[1] Regulators can mandated access without committing to regulate the price too. New Zealand distinguishes between ‘specified services’ where the Commerce Commission cannot determine the ‘price payable’ and ‘designated services’ where it issues pricing determinations. Some countries leave it to the parties concerned to negotiate ‘fair and reasonable’ prices.

[2] The FCC decided to forbear from unbundling and price regulation of FTTH in August 2003, extended this to FTTN in October 2004 and also DSL in September 2005.

[3] Initially, the Federal Network Agency in Germany supported Deutsche Telekom but under pressure from the EU it made an order in September 2010 subjecting VDSL (FTTN) , FTTH lines and Ethernet-based bitstream access to regulation. In Australia, Telstra sought concessions from the Australian government in 2005 ahead of building an FTTN network but these were refused so it chose to invest instead in unregulated HFC

and mobile broadband networks.

4.2 Key Concepts

Broadly, the key concepts in the regulator's access pricing tool kit are:

- **Cost oriented prices** - as required by the WTO Reference Paper can be developed from bottom-up or top-down cost models or from benchmarking rates in similar countries who have used cost models.
- **Cost models** - bottom-up costing for LRIC (long-run incremental costs) where a firm prices in such a way as to cover only the incremental costs of the product (ie the product's LRIC), sales of that product make no contribution to the firm's common costs. There are many variations around this but it is sufficient to consider LRIC to understand the issues and principles [1].
- **Regulatory accounting** - top-down costing associated with FDC (fully distributed costs) where all costs, including joint and common costs, are fully allocated to all the operator's services/products according to a specified distribution/allocation key. The costs of a given service/product are composed of direct volume-sensitive costs, direct fixed costs and a share of joint and common costs.
- **Benchmarking** – compares access prices across a peer group of countries to determine what price would be reasonable.
- **ECPR** – the efficient component pricing rule which is closely related to 'retail minus avoided retail costs'. ECPR is cost-based because it includes 'opportunity cost' [2].
- **BAK** - Bill and Keep has been around for mobile termination in countries with 'receiving party pays' (eg USA) and seems related to 'peering' in internet traffic exchange.
- **GB** – Volume based charging. This is a possible alternative access pricing to address changes in the industry that BAK cannot address.

Related technical concepts:

- **DAC** (depreciated actual cost) – based on historic cost accounting (**HCA**). Some regulators also require current cost accounting (**CCA**) in which assets are re-valued at replacement cost; which may then require further adjustment to 'mean equivalent assets'
- **DORC** (depreciated optimised replacement cost) – takes accumulated depreciation from **ORC** calculated for **TSLRIC**
- **SAC** (stand-alone-cost) – the sum of the incremental cost of the product, plus all the costs which are common between that product and other products. The stand-alone cost is therefore higher than long-run incremental cost (**LRIC**).
- **WACC** (weighted average cost of capital) – derived from the capital asset pricing model and used to set the return to capital.

END NOTES

[1] LRIC is closely related to TELRIC (total element long-run incremental cost) and TSLRIC+ (total service long-run incremental) which is LRIC cost plus an appropriate mark up for the recovery of common costs.

[2] Australian regulation excludes ECPR from principles that maybe considered for access pricing to stop the incumbent from maintain profitability from access products; except in the case of retail-minus pricing of resold access services.

4.2.1 Cost Based Prices

Regulated pricing is needed where an unconstrained provider of an essential facility could exploit its position to charge well above cost. Regulation is a proxy for competition which tends to drive prices towards cost. But cost is a flexible concept.

The WTO Reference Paper requires "*cost-oriented rates that are transparent, reasonable, having regard to economic feasibility*". This leaves a wide degree of flexibility in how to define and measure cost-oriented prices [1]. How it is interpreted in practice is a combination of national guidelines and case law.

The two main options are the [Bottom-Up](#) and [Top-Down](#) costing approaches. Some regulators use a hybrid of these by taking account of actually incurred costs adjusted for efficiency. The two broad options are compared below.

Table 4.2: Bottom-Up and Top-Down Cost Models

	Bottom-Up	Top-Down
Advantages	- Can model costs that an efficient entrant would face - Flexible – can change assumptions readily - Transparent – much of the information used is publicly available	- Incorporates actual costs - Useful for testing results from bottom-up model - May be faster and less costly to implement, but this depends on how well categories in the financial accounts match the data required
Disadvantages	- May optimize —too much or omit costs. If this happens, the operator will be under-compensated and will reduce investment in the network - Modeling of operating expenditure is usually based on simple margins instead of real-world costs - Data needed for the model may not exist - The modeling process can be time-consuming and expensive	- Includes actual costs, which are likely to incorporate inefficiencies - Less transparent – confidentiality issues mean other stakeholders may not have access to the information used - The parties may dispute the cost allocation rules used (the rules used to allocate shared and common costs among specific services) - Data may not exist in the required form

Both costing approaches are demanding for a small, developing country with limited resources. A cheaper alternative is [benchmarking](#).

Bearing in mind that the object of pricing regulation is to produce what be expected in [competitive markets](#), contestable market theory suggests outcomes will lie between a range with the ceiling defined by stand-alone cost and a floor defined by long-run incremental cost.

END NOTES

[1] A survey in June 2010 that found national telecoms regulators apply divergent costing approaches when setting cost-oriented wholesale access prices. The EU Commission opened a consultation on costing methodologies in October 2011 (submissions closed 28 Nov 2011) and Ofcom launched a similar review of costing and regulatory financial reporting in November 2011.

4.2.2 Cost Models

Bottom-up cost models are favoured by many regulators because they reduce reliance on information provided by the incumbent; a necessary feature of top-down models, even when the accounting framework is specified by the regulator.

Bottom-up models for fibre access are appropriate because they are new. Assuming fibre networks are built in an efficient manner, operators can be fully compensated for their construction at today's prices.

The bottom-up approach develops the cost model on the basis of the expected demand in terms of subscribers and traffic and sets the network design and estimates the related costs on the basis of a network engineering model. Bottom-up modelling has the following steps:

Step 1: Define the services to be modelled (for example local access services). This step includes gathering data on the number and location of customers in the geographic area under consideration

Step 2: Determine the design of the network — what facilities are required to provide the service,

and where should they be located?

Designing the network to be modelled requires the regulator to make choices about how much optimization to include in the modelled network:

- The scorched earth approach represents one extreme. It assumes that nothing is fixed, not even the location of the nodes. The scorched earth network is what an entrant would build if no network existed, based on the location of customers and forecasts of demand for services.
- The scorched node approach assumes that the location of network nodes is fixed where they currently exist, and the operator can choose the best technology to configure the network around these nodes.

Step 3: Determine the amount of each type of equipment needed to construct the network

Step 4: Estimate the costs of each element. For each type of equipment multiply the amount required by its unit prices to arrive at the total investment cost. (TSLRIC models usually use current, best-in-market costs)

Step 5: Annualise the total investment cost for each network element. This amount equals depreciation costs and cost of capital for the firm in question

Step 6: Estimate opex. Operations and maintenance costs and non-network costs include direct out-of-pocket operating expenses associated with the investment and indirect expenses, such as corporate overheads

Step 7: Estimate total costs for each network element by adding the annual (monthly) amounts calculated in Steps 5 and 6

Step 8: Unitise costs by dividing the total costs of each network element by the relevant cost-driver, to arrive at unit costs. For example, use the number of lines to derive the unit costs for subscriber loops, or the number of minutes to derive unit switching costs.

In the long term all costs are considered to be variable because the production capacity is not a constraint (as it is the case in the short term). Therefore long run incremental costs include capital and the volume-sensitive costs resulting from a substantial change in production.

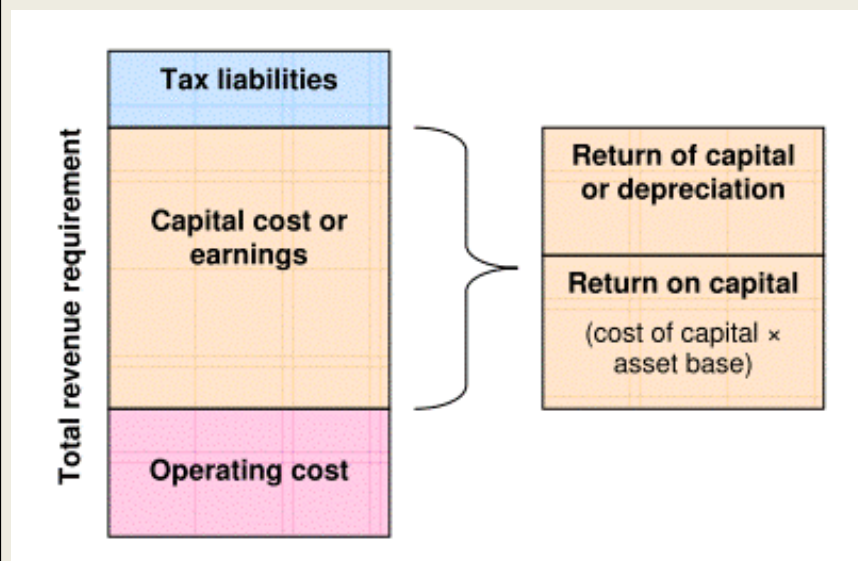
Some regulators have become disenchanted with bottom-up costing models because they essentially rebuild the network from scratch each time the access price is reviewed and each time the models and their many assumptions are contested. As Ofcom puts it: *“This (TSLRIC+) approach is suitable to current generation access networks as they are legacy networks with low demand side risk and substantial sunk costs that have already generated a return on the initial investment. ..This approach may be less appropriate for next generation access networks. So far, these networks are characterised by high uncertainty about consumer demand and willingness to pay, with limited clarity on the applications and services they will deliver. In this situation, investors in a free market would seek higher returns from their investment to compensate for the higher degree of risk.”* [Ofcom, 2007, paras 5.2 and 5.3]

This is why the Australian regulator shifted from bottom-up modelling to a top-down ‘building block’ approach in 2011.

Box 4.3: Australia’s Building Block Method

The ACCC has shifted from its previous pricing methodologies (TSLRIC+ and RMRAC) to a new building block model (BBM) pricing methodology.

The new BBM method is simple – once the opening value of the Regulated Asset Base (RAB) is established. The method takes the asset base for each class of asset (eg ‘ducts and pipes’) subtracts depreciation and adds investment. The cost of capital, depreciation, operating expenses and tax liabilities are then added together to determine the revenue requirement.



The ACCC believes that there is no uniquely correct value for the initial value of the RAB – but says that it must lie in the range bounded by the depreciated historic value of Telstra’s investment in network assets (that is, depreciated actual cost or DAC) and the depreciated optimised replacement cost (DORC) where the ORC value must be depreciated to reflect the age of Telstra’s actual assets.

DAC is a top-down method drawing on management reports and DORC uses bottom-up cost modelling once to calculate ORC and then makes an adjustment for accumulated depreciation. The result is then rolled forward year by year using actual investment and depreciation.

Source: [Final Access Determination](#) (FAD) for Fixed Services., ACCC, July 2011

Bottom-up costing is still the preferred method in many jurisdictions (eg the EU).

4.2.3 Regulatory Accounting

Top-down modelling attempts to measure LRIC starting from the firm’s actual costs as set out in its accounts [1]. This method does not involve detailed network modelling. Instead, a top-down model separates the firm’s assets and costs into service groups, and then adds the extra costs associated with interconnection to arrive at an estimate of LRIC.

This usually involves the following five steps:

Step 1: Identify the firm’s services and separate out interconnection services

Step 2: Identify and separate all costs and assets in the firm’s accounts

Step 3: Allocate all directly attributable costs. If a cost item or asset is attributable to only one service, allocate it to that service

Step 4: Allocate shared and common costs across services using allocation rules. Allocation is essentially arbitrary. Possible allocation techniques include:

- (1) Combinatorial tests - consider whether the prices for different combinations of products lie between the LRIC and SAC of those combinations. Where all the different combinations satisfy this test, there is no over-recovery of common costs. Depending upon the size of the product portfolio of the firm, and the types of common costs, the number of combinatorial tests could be impracticably high.
- (2) Fully allocated cost - As FAC involves allocating all the firm's common costs across all products, the costs for individual products would normally be above LRIC and below SAC. However, the FAC approach allows no flexibility in terms of pricing; common costs are allocated according to a formula (eg number of lines or minutes).

Step 5: Calculate LRIC for each service by adding up the costs allocated to that services, including an appropriate return on those assets allocated to the service.

Top-down modelling uses the firm's current operating costs and either historic cost accounting (HCA, which HCA reflects the cost at the time of purchasing the asset) or current cost accounting (CCA, where network assets are valued at replacement costs). Normally regulators would be expected to use either HCA or CCA and not mix the two approaches. In practice, some regulators recognize that those assets which cannot be economically replaced (such as for example ducts) must not necessarily be valued at their full replacement costs.

Box 4.4: Imputation Reports - Australia

In Australia, the regulator's accounting separation report finds that for all services except local call services, the costs of transformation are at least twice as large as the access costs. This means that whether an access seeker can successfully compete with Telstra in the supply of these services is more likely dependent on its own efficiency as well as service quality and differentiation rather than the access price charged by Telstra.

	Retail Price	Access Costs	%
Local service	\$88.99	\$80.47	90
Domestic long distance	\$0.10	\$0.02	20
International calls	\$0.21	\$0.01	5
Fixed-mobile	\$0.35	\$0.01	3
ADSL	\$149.48	\$49.96	33

Source: Accounting separation of Telstra: Imputation testing and non-price terms and conditions [report for the June Quarter 2011](#), ACCC, October 2011 _

END NOTES

[1] BT's published regulatory financial statements are currently fairly detailed, with the main document stretching to 130 pages, accompanied by a further six published documents, totalling well over 1,000 pages. Ofcom has

asked if anyone finds these accounts useful [[Ofcom, Nov 2011](#)].

4.2.4 Benchmarking

Both bottom-up and top-down cost models are complex to develop and lead to uncertain outcomes. In some markets the detailed information required may not be available. Even where regulators can apply the same cost model for the same access product, divergences in implementation can lead to large divergences in price [1].

A more practical alternative to developing cost models for a developing country with limited resources is benchmarking. Regulators in many jurisdictions have used benchmarking to set initial interconnection rates. For example [Botswana](#) used benchmarking to resolve an interconnection dispute quickly [3].

Benchmarking has two main purposes in interconnection pricing. In situations where detailed cost models can be estimated, benchmarking can be used as a common sense check on the results of the modelling. Alternatively, benchmarking can be used directly to set interconnection prices.

In a benchmarking exercise, adjustments need to be made for differences among jurisdictions, for example population density, local area size, extent of urbanisation, traffic patterns and call durations, input prices, scale economies, exchange rates and taxes.

END NOTES

[1] For example, in Europe the price for unbundled local loop ranges from 5.21 €/month in Lithuania to 12.41 €/month in Ireland [EU Questionnaire, October 2011]

[2] Another effective option would have been [final offer arbitration](#) making clear the regulators preference for LRIC and leaving it up to the parties to narrow their differences and submit models or benchmarking studies to support their respective final positions.

4.3 Pricing Interconnection

With the exception of countries using 'receiving party network pays' (RPNP) for calls to mobile networks, in the switched interconnection context the main basis for pricing originating and terminating access has been some form of LRIC; determined from bottom-up or top-down cost models (or benchmarking countries that do either or both).

The exception (RPNP) uses Bill and Keep (BAK) where the calling party's network retains whatever revenue it raises through retail usage charges. This is the system used for mobile networks in the USA. One advantage of a bill and keep policy is that it can be adopted quickly without the need to employ a cost analysis.

Except for RPNP, pricing interconnection becomes problematic in an IP environment because many parties can be involved in handling any packet. BAK looks very similar to internet [peering](#), so it has been suggested that pricing IP interconnection will converge on BAK. This makes BAK look attractive except for mobile operators in countries with 'calling party network pays' because they have enjoyed high termination rates.

BAK is the IP Interconnection model favoured in Europe (BEREC, June 2010) because:

1. Costs are falling with the transition to NGN networks so the difference between switched and IP interconnection rates is getting smaller. In mobiles, this convergence is being helped along by regulation and market forces [1].
2. BAK reduces regulatory cost and uncertainty. Also moving cost recovery from termination, which is a regulated market, to competitive retail markets increases incentives for cost minimization.
3. Assuming usual plausible cost and utility distribution and bearing in mind their uncertainty, BAK is likely to internalize call and network externalities better than CPNP.
4. BAK is expected to lead to higher average usage per capita and a lower average price per minute. BAK decreases the marginal costs of traffic and the cost risk related to flat-rate offers that drive higher usage. Higher usage in combination with the large scale effects (economies of scale present in fixed and mobile networks) create lower costs per minute and so BAK feeds a positive feedback loop of higher usage and lower prices.

However, there are a couple of problems with BAK. First, it does not address the leakage of revenues that comes from the de-layering of the industry. BAK assumes there is some reciprocity: 'You can keep revenues from your customers and so shall I'. But, 'over-the-top' service providers like Skype get to BAK without having a network and making no direct contribution to any networks its customers use.

Indirectly, Skype's customers pay their respective network provider for data traffic they generate using Skype services. Such leakage could increase the risks of investing in broadband networks.

Second, while vertically-integrated network operators can BAK retail customers with managed IP voice and SMS services enabling them to maintain a premium over services delivered over 'best-efforts' internet (like Skype), the options for wholesale-only network operators are more limited. The options are discussed in the next section.

END NOTES

[1] Regulators allowed high mobile termination rates initially to stimulate competition for fixed networks and to promote mobile penetration. But regulators are now driving-down mobile termination rates towards LRIC to promote mobile competition: high termination rates combined with 'on-net' calls cheaper than calls to other networks disadvantages smaller operators.

4.4 Pricing Unbundled Access

Regulating unbundled access has traditionally been done in the context of fixed copper networks and priced to some form of LRIC. Models have been used to calculate the LRIC costs of unbundled local loop, line sharing and transmission (both access tails and transmission links).

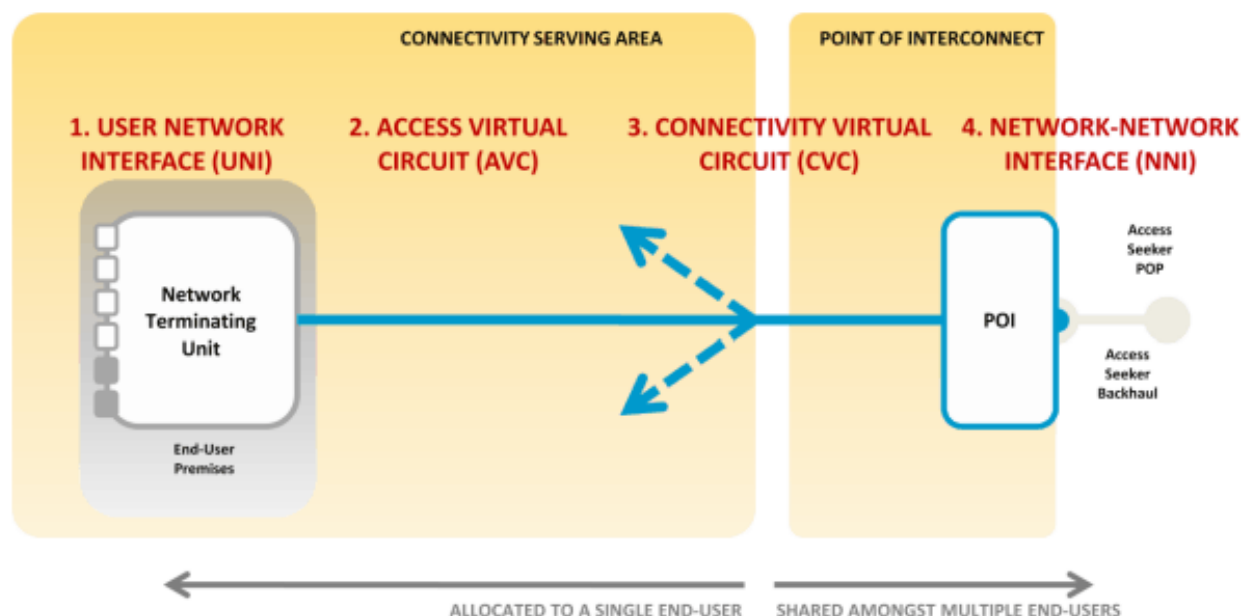
The approach to pricing access on fibre networks is still evolving to deal with both the different kinds of access products required (eg bitstream access and sub-loop) and the different level of risk associated compared with copper networks. Mindful of the need to encourage investment in fibre networks, the FCC chose to forbear from mandating access while Ofcom mandates bitstream access but forbears from regulating the access price [1].

At the same time as adjusting for risk, the relativity between access prices for copper networks and fibre networks has to be managed as this will affect the transition to fibre networks. And, the price relativity between different kinds of access products on each access platform will affect investment choices.

With FTTN, there is no analogue replacement access product for unbundled local loop. Two choices may be offered: bitstream access (much like line-sharing) or sub-loop unbundling at the node (street cabinet; combined with a back-haul access product). In practice, only bitstream will be used as the addressable customer market at the node is too small to make a business case for unbundling at that level.

With FTTH, unless it is a PTP network (which would allow dark fibre), the access product will be wholesale bitstream access (WBA). There are four components to the price in the FTTH network being built in Australia (Figure 4.1) where the critical link between the end customer and the POI is split between the individual fibre to the end customer (AVC, priced by speed and QOS to the end customer) and the aggregation link (CVC) dimensioned by the wholesale customer to handle its AVCs.

Figure 4.1: Bitstream Access in Australia



Source: NBN Co. Product and Pricing Overview for Access Seekers, Dec 2010

This model is the same [2] as in Canada which has mandated two pricing options (Box 4.5). The other option is flat-rate. Flat rate is like copper based access pricing (eg ULL and LSS) but it does not take account of the growth in data traffic. The problem with flat-rate pricing is that it puts the onus on the access provider to increase the capacity of the network to handle extra traffic without a proportionate contribution towards the cost of doing that.

Box 4.5: Canada

In Canada in 2000, the CRTC, permitted cable carriers to introduce usage caps and/or usage-based billing (UBB) charges for their wholesale services if UBB was also applied for their retail customers. Later, this option was extended to telephone companies offering broadband access.

On 25 January 2011 (Decision 2011-44), the Commission set the UBB rates at retail minus 15 percent. But the concession was not enough for many independent ISPs which together account for just 6 percent of the residential retail market - they were hoping for the CRTC to grant them a 50% discount.

The January decision ignited a consumer backlash and a wave of public scorn hit Ottawa ahead of the May federal election, quickly turning into a hot-button issue for a minority Conservative government and opposition parties alike. Also Netflix Inc. expressed serious concerns about its future in Canada - "[usage-based billing] is something we're definitely worried about," (Reed Hastings, chief executive of Netflix). On Feb. 3 2011, the federal Cabinet advised the CRTC that if it did not review the decision and come back with a new one, it would be reversed.

The revised model that the CRTC finally produced on 15 November 2011 offers two options. First, for companies that proposed a usage-based model, their tariffs have to be based on the approved capacity model, effective 1 February 2012. For companies that proposed a flat rate model, their tariffs were approved effective immediately.

The capacity model requires ISPs to choose what bandwidth of pipe it wants in order to carry traffic between aggregation points (eg street cabinets) and the handover point. This is similar to the wholesale model proposed or the new broadband network in Australia. If ISPs do not order enough capacity, their traffic will become congested without affecting other ISPs.

This should appease content providers like Netflix but there is no incentive for ISPs to buy bigger pipes to accommodate traffic for which they little or nothing?

Sources: CRTC Telecom Regulatory Policy CRTC 2011-703 [15 Nov 2011]
<http://www.crtc.gc.ca/eng/com100/2011/r111115.htm> Financial Post, 1 October 2011
<http://www.nationalpost.com/news/Netflix+face+Canadian+regulations/5487301/story.html>

Financial Post, 16 November 2011
<http://www.financialpost.com/news/CRTC+ruling+hits+smaller+ISPs/5716827/story.html>

An obvious neutral solution is volume based charging: exactly what the CRTC blocked [3]. The days when customers enjoyed unlimited downloads on broadband may be numbered. Twenty OECD countries currently have no data caps at all among their broadband offers (OECD, 2011). But things are changing. One of the twenty is the USA where AT&T slapped 150GB and 250GB data caps on its broadband DSL and U-Verse customers. Ultimately at the wholesale level, a monthly fixed fee for each access line plus a charge per GB for total volume downloaded across those lines may become a best practice option.

Another reason for moving in this direction is that both mobile and fixed broadband networks have had content and carriage effectively unbundled by the de-layering of the industry brought about by digitising networks. The network operators' responses and the regulator's role in this development are discussed in [Section 5](#).

END NOTES

[1] Ofcom has set standards for the virtual unbundled local access (VULA) service but chooses not to regulate prices in emerging markets and believes that prices will be constrained by legacy products.

[2] In the CRTC's regulated 5410 access service, GAS and AHSSPI (aggregated high speed service provider interface) correspond to NBN Co.'s AVC and CVC tariffs.

[3] At the wholesale level, volume based charging should apply to the total wholesale customers traffic; perhaps on an area basis but certainly not per end customer as Bell Canada wanted to do. That is the prerogative of the retail provider; which may choose to use monthly data caps instead of a simple volume tariff.

4.5 Pricing Infrastructure Sharing

There is a general consensus that infrastructure sharing should be based on cost-oriented pricing and open access models. Countries have differed, however, on the approach taken to establishing costs.

The EU considers infrastructure sharing to be just another example of unbundling. It says access to existing civil engineering infrastructure of a regulated operator on Market 4 (wholesale network infrastructure access) should be priced with the same methodology used for pricing access to the unbundled local copper loop taking into account actual lifetimes of the relevant infrastructure. The same method applies to new (fibre) infrastructure except that a higher risk premium [1] may be allowed in the return to capital (WACC).

The New Zealand regulator accepted the advice of the industry that it was not required to regulate access pricing for mobile co-location [2].

END NOTES

[1] Risk factors identified by the European Commission are (i) uncertainty relating to retail and wholesale demand; (ii) uncertainty

relating to the costs of deployment, civil engineering works and managerial execution; (iii) uncertainty relating to technological progress; (iv) uncertainty relating to market dynamics and the evolving competitive situation, such as the degree of infrastructure-based and/or cable competition; and (v) macroeconomic uncertainty. These change over time and are lower for FTTN networks than FTTH networks.

[2] In New Zealand mobile co-location is not a 'designated service' but a 'specified service' so that the Commerce Commission does not have the power to determine prices. And, in Australia duct access is a 'declared service' but the ACCC has never had to arbitrate an access price.

4.6 Pricing Resale

The generally accepted price rule for resold services, P_a , is 'retail minus avoided retail costs' (RMAC). Under this rule, the price paid by resellers is equal to the providing firm's retail price of the service, P_r , less its cost of retailing functions, C_r , avoided with resale:

$$P_a = P_r - C_r$$

RMAC is equivalent to the Efficient Component Pricing Rule (ECPR) also known as the Baumol-Willig access pricing rule which says that the marginal costs of access include not only the direct costs, C_a , but also the 'opportunity costs'. That is the access price, P_a , should be:

$$P_a = C_a + (P_r - C_a - C_r)$$

So long as the reseller's own retail costs are less than C_r , it can compete with the incumbent.

Although DSL is not a 'declared' (ie regulated) access service in Australia (because entrants can build and resell their own DSL services based on ULL or LSS), the incumbent has volunteered [1] to resell its ADSL services in all areas at RMAC (Box 4.6).

Box 4.6: Telstra's ADSL2+ prices

In Australia, unbundled loop pricing is regulated but resold ADSL services are not regulated. As part of the negotiations around the National Broadband Network (NBN), the incumbent agreed to resell ADSL2+ services set equal to Telstra's retail price minus its avoidable retail cost.

The Retail Price input is based on the weighted average price over all plans, including when supplied as part of a bundle. Avoidable retail costs sourced from Telstra's internal management accounts include the costs that Telstra would avoid if, instead of supplying its retail ADSL services through retail channels, it supplied those services through the wholesale channel. Some examples of such costs are retail sales and marketing costs and call centre costs. Zone 1 includes 90 per cent of fixed lines.

National Average Retail Price for ADSL	P_r	= \$56
– Short Run Marginal Avoidable Retail Cost	C_r	= \$15
– Fixed Avoidable Retail Cost Allocated to Zone 1	C_r	= \$10
Equals ADSL2+ Wholesale Reference Price (Zone 1)	P_a	= \$31

Even if an entrant is not as efficient in retail as Telstra, it may choose to resell Telstra's ADSL services to build market presence ahead of the roll-out of the NBN.

Sources:

A guide to Telstra's price-related interim equivalence and transparency obligations, 5 September 2011 <http://www.accc.gov.au/content/index.phtml/itemId/1003999> and

Accounting separation of Telstra: Imputation testing and non-price terms and conditions report for the June Quarter 2011, October 2011 <http://www.accc.gov.au/content/index.phtml/itemId/670198>

In New Zealand, the unbundled bitstream access (UBA) service was made available as a regulated product before ULL was made available. UBA has been regulated at RMAC.

Not all competitors are interested in using resale as their retail market strategy. If they use, say, unbundled local loop to provide both voice and broadband services there could be some inconsistency with resold local services.

An issue with RMAC is that comparisons between retail services and wholesale services are complicated because retail business units do not necessarily use the same cost elements, in the same quantities, in the same geographic areas and for the same end-users as wholesale customers.

END NOTES

[1] There is strong ULL and LSS based competition for DSL services in urban areas. In other areas it is uneconomic for entrants to deploy DSLAMs to use ULL and LSS. Before, investing in non -urban areas Telstra extracted a promise from the Minister for Communications that DSL would not be regulated (although Telstra still resold these services at commercial, undisclosed rates).

5 Regulating 'Over-the-Top' Services

Internet telephony, or “Voice over the Internet Protocol” (VoIP), is the first ‘over-the-top’ (OTT) service with major implications for the business models of both fixed and mobile network operators. More recently, text messages (SMS) have also been delivered OTT affecting the revenues of fixed and mobile operators.

Figure 5.1: OTT voice and messaging smartphone applications



From left to right: Skype, Google Voice, Viber, Talktone, Whatsapp, Blackberry and iMessage

OTT services are enabled by the [de-layering](#) of the industry. IP has separated carriage from content and allowed ‘over-the-top’ content and applications providers to deal directly with end users over networks whose owners and operators are excluded from these transactions. The move to LTE’s all-IP architecture will create a more open environment for these OTT providers and third party services.

It is not only telecommunications that is affected. Internet television over broadband fixed and mobile networks is de-stabilising existing broadcasting industries.

In the following sections, we look at the policy issues raised by VoIP and other OTT services and the new concepts that apply before turning to regulatory options for managing VoIP and other OTT services.

- [Policy Issues](#)
- [Key Concepts](#)
- [VoIP](#)
- [Other OTT services](#)

5.1 Policy Issues

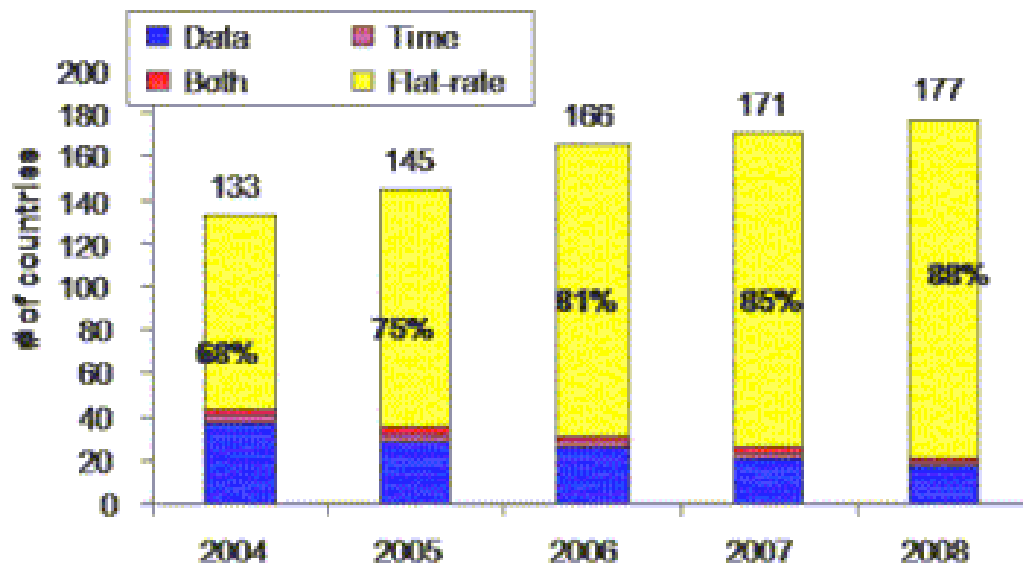
Proliferation of content and applications services is to be welcomed – they add utility for users. Some new ‘over-the-top’ (OTT) services did not previously exist and do not undermine the current operator business models (eg location-based GPS mobile services). Some new OTT services may threaten the economics of investing in fast broadband networks and (eg internet television).

But, change is inevitable. As network operators migrate to next generation networks, voice services will become software applications riding over the network. During this transition, policy-makers are finding different paths to balancing innovation, investment and competition.

The many policy and regulatory issues specific to [VoIP](#) are considered below.

Regulators cannot hold back the tide of changes to maintain the status quo. To a large extent, existing operators are able to change their business models to stay afloat. For example, OTT services manifest themselves on networks as traffic. If network builders and operators align revenue models more with traffic, their financial position is more secure. This would reverse current trends [1].

Figure 5.2: Growth of Flat-Rate Pricing Strategies for Broadband Internet



Source: Figure 4, Voice over Internet Protocol (VOIP), [GSR Discussion Paper](#), November 2009

These changes are disruptive and inconvenient for those with a stake in existing arrangements. But the benefits of change outweigh the costs. For example, VoIP leads to dramatic reductions in the cost in telecommunication and this has beneficial impacts on the development of business and economic growth. India found that VoIP opened up new employment opportunities with call centres serving overseas markets.

Regulators generally support innovation. They prevent fixed and mobile operators from blocking or degrading competing services.

END NOTES

[1] In 2009-2010, 20 OECD countries had no data caps at all among their broadband offers. One of these changed in May 2011 when AT&T slapped 150Gb and 250GB data caps on its DSL and U-Verse (fibre) customers.

5.2 Key Concepts

VoIP has been around for a number of years but there are several other 'over-the-top' (OTT) concepts that will become increasingly important. The concepts are all the product of the digitisation of fixed and mobile networks. Key concepts include:

- **VoIP** also known as voice-over-broadband (VOB) or internet telephony takes a number of different forms. Across different platforms, VoIP services can be phone-to-phone, PC-to-PC ('on-net'), PC-to-phone ('inbound'), phone-to-PC ('outbound') and phone-to-phone ('bi-directional' between different networks). The different forms are reflected in licensing conditions. [1].
- **SMS** – the short message service (texting) has been a very lucrative business for fixed and mobile operators. While network quality is a major constraint to some OTT voice applications, SMS applications are less reliant on QOS, due to them using less data and having a higher tolerance for latency.
- **Applications (Apps)** – This term is now associated with smartphones. Early examples include Skype (first on fixed networks but now also mobiles) and there are now thousands provided by mobile operators and third parties [2]. Their important characteristic is that they are carried over the data part of mobile service.
- **Cloud Services** - The general idea of the 'cloud' is to store your media on the internet so you can access it from any device anywhere, as opposed to leaving it on a hard drive. Apple, Google, Amazon, Microsoft and Dropbox all offer cloud services.
- **Internet Television** – With Internet ('best-efforts') TV (e.g. Apple TV, Google TV, Netflix) the consumer pays for the content

package separately, and in addition to, the broadband access package. There is no guarantee of the quality of service. The content provider may use a VPN (Virtual Private Network) to try and secure the content from copying or may be encrypted and decrypted. But, it is delivered over the top of the Internet Service (ISP) provider's network.

· **IPTV** - IPTV is not 'over-the-top' because it is provided directly by carriers and ISPs. The consumer pays the ISP for both the content package and the broadband delivery package (e.g. 'Triple Play' bundles telephony, broadband and television). This allows the ISP to 'guarantee' some quality of service with its Content Delivery Network (CDN) to ensure that the video content is coming from the nearest possible server to the consumer's premise and over its own network.

Our focus in this module is on what these concepts mean for the regulation of competition and pricing. But we shall look also at consumer protection and other issues that arise in the context of VoIP.

ENDNOTES

[1] For a helpful power-point presentation on VoIP technology basics, see the Ofcom power-point pack presented by [Peter Ingram](#).

[2] A source on trends in this new industry is www.distimo.com

5.3 VoIP

VoIP is the first of the apps enabled by IP to threaten traditional telecommunications business models because they depended on voice revenues (and mostly still do). Policy and regulatory issues and responses have evolved with the maturity of the VoIP market.

Table 5.1: VoIP Regulatory Issues

Early VoIP Market	Maturing VoIP Market	Mature VoIP Market
'Grey market' (self-help) bypass and illegal termination		
Quality of service (QOS)		Consumer protection
Universal Service		Security of transmissions
Defining VoIP and its legality	Regulatory capture	Net neutrality and blocking
Licensing	Emergency services	Location correspondence
Numbering	Number portability	Market size and growth
Promoting competition		(Anti-) competitive issues

Source: Adapted from Table 1, VoIP enemy or Ally?, GSR 2009, P Biggs

The key policy issue is how to regulate VoIP compared with the telephone services it replaces [1] or displaces. Some countries view VoIP as a voice service while others view it as data: a 'value-added' or 'information' service. For example, Bolivia, Czech Republic, Egypt, Jordan and the United States view VoIP as data, while Dominica views it as voice. In the European Union, VoIP can be classified as either an Electronic Communication Service or as a Publicly Available Telephone Service.

Despite its limitations, users increasingly view VoIP as 'functionally equivalent' to conventional telephone service. The quality of VoIP has improved and users can now obtain a PSTN telephone number and receive calls originated on the PSTN. Technical and consumer protection aspects are discussed in

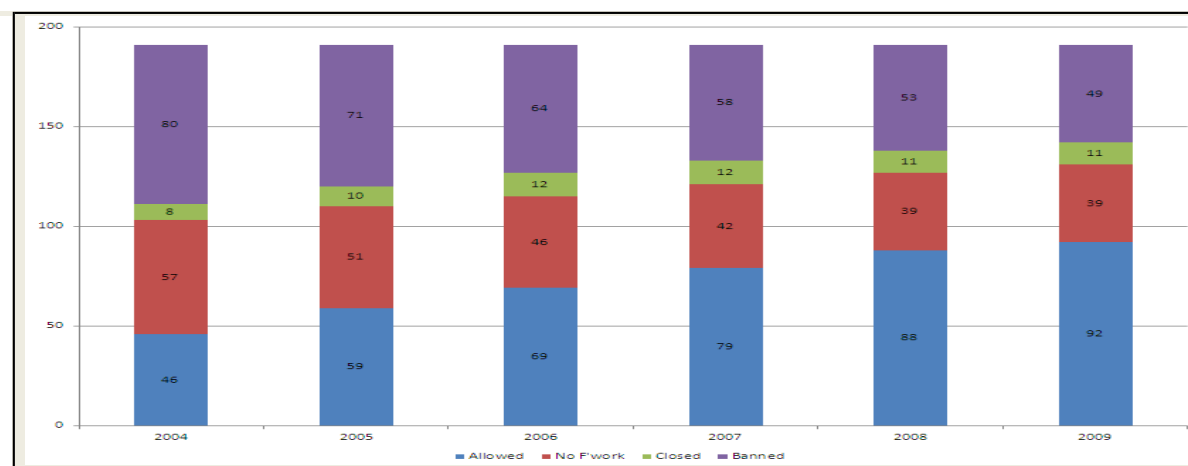
regulatory implications of VoIP.

Most countries licence different types of VoIP service. Policy makers then have to decide what aspects of conventional telephony regulation should apply to each class of VoIP service because the differences between VoIP and conventional voice service will have implications for universal service arrangements, telephone number management, public safety, and national security. For example, VoIP services are generally unable to provide access to emergency service if there is a power cut or to give reliable location information in the case of an emergency.

Recognizing the difficulties of translating existing regulatory frameworks into the IP world, the European Commission advocated a 'light regulatory touch' when it first examined VoIP regulation in 2004. The United States initially took a similar approach, but VoIP is becoming more regulated over time in the United States; especially in the context of security concerns (whether and how VoIP traffic can be monitored) and access to emergency call services. With a 'light touch', regulation is confined to specific matters such as access to telephone numbers, number portability, access to emergency services, universal service, and national security.

The number of countries attempting to ban VoIP is continuing to decline:

Figure 5.3: Status of VoIP Regulation Across ITU



Source: Figure 2, [GSR 2009 Discussion Paper, Voice over Internet Protocol \(VoIP\): Enemy or Ally](#) November 2009

But it is very difficult to stop unlicensed VoIP services which can traverse the telephone network without detection. Even where regulators permit only limited or no VoIP services, incumbent operators will still face VoIP competition.

Box 5.1: VoIP Licencing and Bangladesh

The licensing of VoIP in Bangladesh was delayed while attempts were made to establish a common platform to route all VoIP calls for national security reasons and to monitor VoIP revenues. Then when the current licenses were issued in 2009, they were set high to minimize the number of competitors.

At that time, it was thought that up to 200 illegal VoIP providers were operating in Bangladesh; mainly connecting international calls from pre-paid card users, using VSAT links. The use of VSAT for voice services is not permitted. VoIP-based call termination business captured over 40 per cent of the market of incoming and outgoing international calls.

Bangladesh now requires all calls including inter-operator VoIP calls to be routed through Interconnection Exchanges or International Gateways. Intra-operator VoIP calls and other domestic data traffic must be routed through National Internet Exchanges.

The regulator, the BTRC, is still catching illegal VoIP operators. In the first eight months of 2011, the Rapid Action Battalion seized Voice over Internet Protocol (VoIP) equipment from eight unauthorised VoIP business centres — seven in the capital and one in the port city of Chittagong. And the BTRC has a running banner on its site saying: ‘Urgent Notice on Illegal VOIP: If you receive any overseas call which has a CLI display of any Bangladeshi mobile or PSTN number, please send us that number (contact details provided)’. Changing the calling number from international to local before presenting it for termination on a fixed or mobile service reduces the interconnection payable (and if it terminated as data on, say, a PC no number substitution is necessary and no fee is paid).

Sources: [International Long Distance Telecommunications Services Policy](#), Bangladesh Ministry of Posts and Telecommunications, May 2010, TeleGeography, 6 Aug 2009 and [VoIP and relevant Issues: Bangladesh's Context](#) and article at <http://hackwere.com/voip/voip-news/bangladesh-started-action-against-illegal-voip-providers.html>

The ability of mobile broadband users to access Skype using iPhones led certain European operators to block Skype access over their networks to prevent loss of revenues. Regulators are now beginning to stop such practices on the basis that it is inconsistent with [net neutrality](#).

VoIP class licences have different rights and obligations attached to each type of licence depending upon how closely the licensed service resembles PSTN voice services. [Barbados](#) has four different classes of VoIP services.

Box 5.2: Singapore and Hong Kong VoIP Licensing

Singapore also has just two class licences. VoIP providers who want PSTN numbers (starting with ‘6’) must adhere to all PSTN rules VoIP providers can also get 8-digit numbers starting with ‘3’ where PSTN rules do not apply.

Hong Kong also adopted a two-class approach to regulating IP Telephony. Both classes of service provider must provide access to emergency services and to reserve power, but they differ in the requirements they face for number portability and numbering. Class 1 is equivalent to PSTN voice service with number portability, but Class 2 lacks numbering rights.

Sources: [Asia-Pacific Economic Cooperation Telecommunications and Information Working Group, Tuesday, 25 April 2006, VoIP in Singapore, presented by Muhd Hanafiah](#)

and <http://www.ofta.gov.hk/en/tips/servicetype/local/voip.html>

In the future voice telephony will migrate completely from circuit switched telephony to VoIP. Once this happens, Internet interconnection and pricing models may replace the current arrangements. Until that happens, VoIP network operators will need to interconnect with incumbent network operators’ PSTNs.

VoIP providers require access to the PSTN to terminate calls to recipients who do not subscribe to the VoIP provider’s service. Interconnection typically occurs between a VoIP operator’s gateway and the PSTN operator’s point of interconnect closest to the call originator or recipient. For calls terminating on fixed networks, VoIP operators should pay PSTN operators for call switching and routing in much the same way that other carriers (such as mobile and long distance operators) do. This may be hard to enforce (Box 5.1).

Call originations from fixed networks may require a different pricing and access mechanism. For many VoIP services, the caller originates the call over a broadband access link or a wireless network. Carriers

have no visibility of such VoIP calls originated on their access networks; they are just part of data traffic. However, no originating interconnection fee should arise because the customer is paying for the access link and any traffic carried over it.

Wireless networks will have a substantial impact on VoIP service development, particularly in developing countries. As wireless and VoIP traffic increase, differences in the terms and conditions under which wireline, wireless and VoIP operators interconnect networks will create opportunities for [arbitrage](#) and distort markets. Differences in call termination rates and interconnection arrangements can cause operators to adjust traffic flows to obtain the lowest possible rate, and to minimize regulatory fees.

ENDNOTES

[1] In Australia, the government-owned national broadband network (NBN) will replace approximately 93% of the copper PSTN with a fibre-to-the-premise network. The Network Terminating Device supports 2 voice (and 4 data) ports which will support voice. An ATA adaptor will be provided so that existing telephones can be used. But at the time of writing (November 2011), the responsibility for providing battery back-up (needed to satisfy standard telephone service standards for emergency calling) was unresolved.

5.4 Other 'Over-the-Top' Services

There are a number of other OTT services apart from VoIP that have been enabled by IP and which all have significant implications for market developments. They may pose a challenge for existing providers but do not seem to be as challenging for regulators as VoIP.

Apps that enable instant messaging and voice communication via data plans compete directly with the SMS and voice services upon which operators depend for a substantial portion of revenue. The average revenue per delivered byte is dropping, as SMS bytes, are replaced by 'over-the-top' bytes.

Box 5.3: SMS and AT&T

AT&T provides a typical example of how lucrative SMS is for mobile carriers and how they may respond to the threat from OTT messaging apps.

AT&T charges 20 cents per text message if a customer does not have a messaging plan or has exceeded the allotted number of texts. From August 2011 AT&T eliminated the \$10-per-month 1,000 messages option and the \$5-per-month 200 messages option for individuals. New customers have the choice of either \$20 per month for unlimited texting or paying \$0.20 for every text and \$0.30 for every multimedia message that they send or receive.

Given that an SMS message is at most 160 bytes in size, this cost scales to \$1,310 per megabyte sent via text message. A one-minute phone call uses up the same amount of network capacity as 600 text messages, so that if the same cost-per-MB were applied to phone calls, mobile phone calls would cost \$120 per minute.

To deal with OTT messaging apps, AT&T replaced its \$30 per month unlimited data plan in June 2010 with two options. One offers up to 200MB for \$15 per month (with additional use charged at \$15 per 200MB). The other offers 2GB for \$25 per month (with additional use charged at \$10 per 1GB).

Sources: AT&T June 2, 2010 Press release <http://www.att.com/gen/press-room?>

But SMS is not dead [1]. The apps that compete with it depend upon both ends of the communication using the same app: they are closed systems. But SMS is on every phone: not just smartphones.

SMS is almost as good as email which runs on every platform and carrier throughout the world. Email is not available on every phone but in some cases it is better than SMS. For example, in Japan SMS is not cross-carrier. So a DoCoMo customer cannot text a Softbank user. But, if the phone has an e-mail client and an email address, it is the best messaging option in Japan; as long as you have a cheap data plan. And, it is more easy for manufacturers to build email clients into phones than anything else, because email has standard protocols behind it.

Cloud Services

Traditionally, users had to physically connect devices to move, say, a photo from a smartphone to a home computer. With cloud services, as soon as a photo is taken it can be uploaded immediately to the cloud to be viewed anywhere, on any device. Google, Microsoft, Apple, and Amazon have all made significant investments in their operating systems and cloud services so that computers and mobile devices will seamlessly and silently upload files to one master location.

Cloud services put more pressure on network capacity. Traditional (physical) syncing placed no demands on the network but the cloud changes things. Now, instead of consuming no bandwidth when syncing 100 MB of photos back to a computer, cloud syncing uses 100 MB of data when uploading data and then an additional 100 MB downloading to each device connected to the cloud. While most services offer the option to sync only when on WiFi networks (e.g. coffee shops, living rooms), these cloud services could still result in significant additional bandwidth costs and potential bill shock for consumers. For subscribers who perform complete system back-up, the shock could be even greater.

There are no clear issues yet for competition and pricing and any that emerge are likely to be addressed first in developed markets.

Internet Television

Digitisation of broadband networks (both fixed and mobile) is causing tectonic shifts in business models. Traditionally, carriage and content went together: not any more. Video was the 'killer app' that prompted the building of cable and broadband networks. The network builders assumed they would be the providers of the content. But the impetus for delivering content over broadband is now coming from non-traditional sources that do not build the networks they rely on.

Box 5.4: Netflix

In 2007, Netflix started streaming back-list movies to subscribers in the USA and now has over 20m customers globally. It began offering unlimited movie downloads in Canada for \$7.99 a month in 2010 and by August 2011 it had signed up 10 per cent of Canadian broadband households; a feat that took six years in the United States.

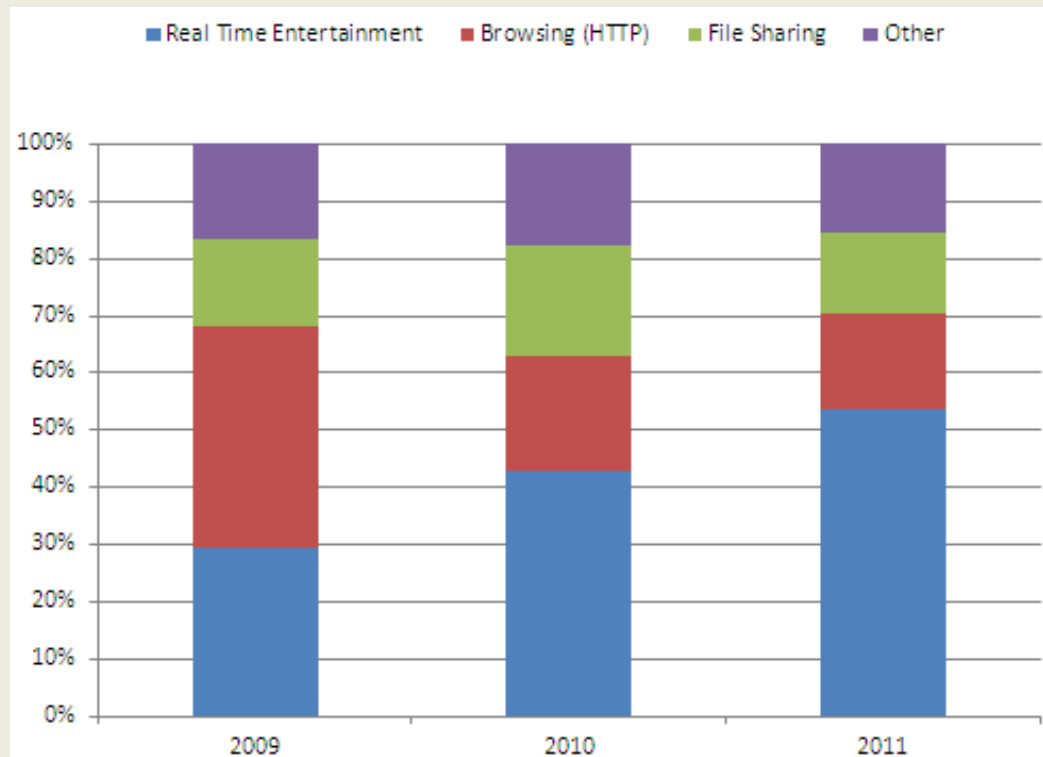
Sandvine reports that Netflix accounted for 32.7 per cent of all North American peak fixed access downstream content in the Fall of 2011. That put Netflix ahead of the other three top Internet protocols

or services by daily volume—approaching double HTTP (17.48 per cent), almost three times YouTube (11.32), and nearly four times BitTorrent.

Source: Sandvine [Global Internet Phenomena Report](#), Fall 2011

Content producers, equipment vendors and communications service providers have a ‘three screen’ strategy to deliver content to TVs, computers and mobile devices [2]. More than half the peak-period traffic over fixed access networks is real-time entertainment with more than half going to game consoles, smart TVs, handhelds and mobile devices rather than to desktop and laptop computers.

Figure 5.4: Peak Period Traffic Composition, North America



Source: Sandvine [Global Internet Phenomena Report](#), Fall 2011

Not only have the builders of networks been deprived of the revenues that they expected out of video but also they have to augment their networks to keep-up with the growth in video traffic; on which they earn very little. Most video traffic adapts to network congestion by shifting to lower bitrates and quality, which impacts the subscriber experience on broadband. When capacity is increased, adaptive video simply upshifts to a higher fidelity and fills the new capacity [3].

Regulators do not want to stifle innovation across content and devices. Carriers will have to adapt their business and pricing models.

ENDNOTES

[1] This part of the discussion of SMS and email draws on <http://www.phonearena.com/news/The-death-of->

[2] For example, in October, 2011, Microsoft announced a massive expansion in the list of content providers that will be available on the Xbox 360, including such names as Bravo, Comcast, HBO, BBC, Telefonica, Rogers on Demand and Televisa.

[3] One of the features of TCP is that each data packet must be acknowledged by the receiver or it will need to be retransmitted to guarantee in sequence delivery of the original data stream. If these acknowledgements are unable to quickly return to the originating server, then the TCP streams carrying the subscriber's video will slow down. This is seen by the subscriber as a downgrade in their quality of experience.

6. Mobile and Wireless Network Regulation

Mobiles have been a spectacularly successful communications technology in both developed and developing countries. Most markets can support mobile competition. Also, mobile is the best way to extend telephone service in developing countries because mobile infrastructure is cheaper to deploy than fixed networks. Compared with the fixed network, regulation of mobile competition and pricing is light because competition makes regulation less necessary.

Box 6.1: Somalia

An extreme example of light-handed regulation is Somalia. Since January 1991, most of Somalia has had neither security nor stability. Yet, the business success story of the last 20 years has been the growth of the mobile telecommunications sector. There are nine networks to choose from and they offer services from texting to mobile internet access.

There is no need to get a licence and there is no state-run monopoly to prevent new competitors being established. And of course there is no-one to demand any taxes, which is one reason why prices are so low.

Despite the absence of law and order, bills are paid and contracts are enforced by relying on Somalia's traditional clan system. The warlords realise that if they cause trouble for the phone companies, the phones will stop working again, which nobody wants.

Source: BBC, 26 January 2011 <http://www.bbc.co.uk/news/world-africa-12278628>

In developing countries, the fixed network is relatively immature with mobiles being the platform of choice for cheap deployment. According to ITU data, as at the end of 2009, over 65 per cent of countries worldwide have full or partial competition in basic services (local, long distance and international services) and 90 per cent of countries have either partial or full competition in the mobile sector.

Wireless networks share many of the same competition and pricing issues as the fixed network and examples of mobiles have been used in previous sections. In this section, we focus on issues which are specific to wireless and mobile networks [1]. Where specific issues are covered in depth in other Modules [2], we shall touch only on how they affect competition and pricing.

In this section we shall explore:

- **Policy Issues**
- **Key Concepts**
- **Spectrum Policy**
- **Interconnection**
- **Roaming**
- **Infrastructure Sharing**

· Enhancing Competition

The important guiding principle emerging from these topics is that regulation should neither dictate users' preferences nor interfere with the flood of innovation flowing through mobiles.

END NOTES

[1] Some might distinguish between fixed wireless and mobile platforms. The former include 'fixed mobile' services and WiMAX. For convenience, we shall refer to mobiles because the regulatory issues are largely the same. Also, the idea of what constitutes a mobile phone is changing fast. How should we count e-readers, tablets, wireless broadband dongles and machine-to-machine communications which all depend upon wireless connectivity?

[2] For example, specific issues covered in other modules include [spectrum](#), [licensing](#) and [Universal Service](#).

6.1 Policy Issues

There are a number of policy issues with aspects specific to mobiles [1]:

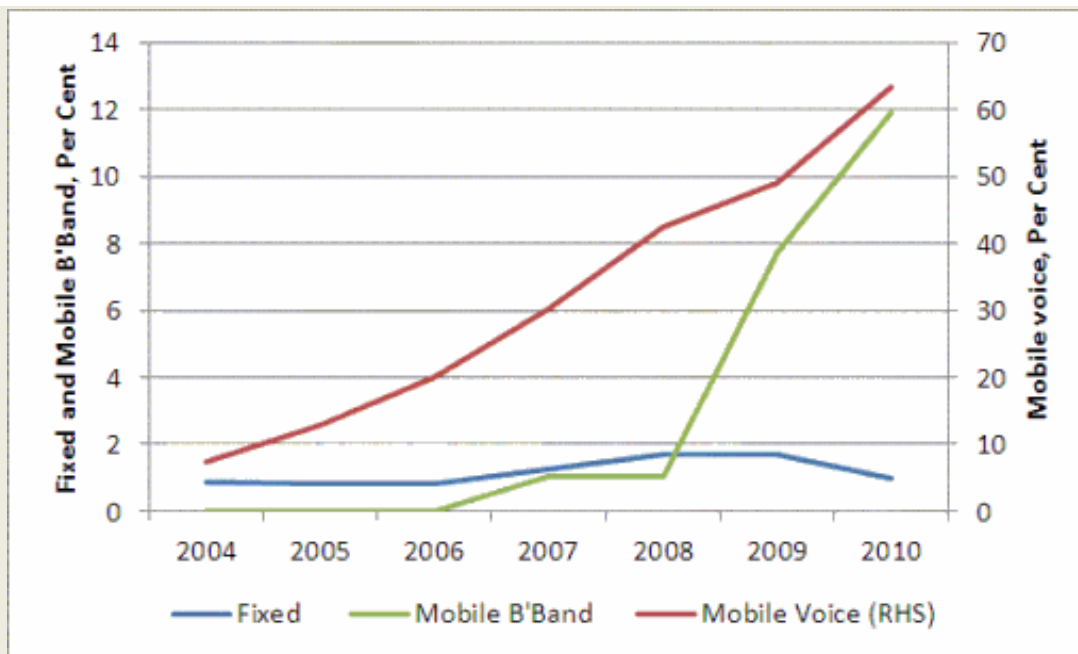
- [Spectrum Policy \(6.3\)](#)
- [Interconnection \(6.4\)](#)
- [Roaming \(6.5\)](#)
- [Infrastructure Sharing \(6.6\)](#)
- [Enhancing Competition \(6.7\)](#)

Mobile and other wireless services are becoming effective substitutes for fixed telecommunications services for some users. Indeed, in many developing countries, wireless minutes of use exceed fixed minutes of use. This trend brings into question the long held assumption that an incumbent telecommunications operator will necessarily be the dominant operator in the market.

An open question is whether the success of mobiles will hinder the development of fixed broadband services. There has been call substitution from fixed to mobiles for some years and now there is mounting evidence of line substitution too (Box 6.2). It probably does not matter if fixed services are available to businesses in cities and residential customers find mobile broadband adequate [2].

Box 6.2: Mobiles Dominate Voice and Broadband: Kenya

Kenya was a slow starter with only 114,000 subscribers seven years after mobile was first introduced. It was thought to be too expensive for the mass market. But following market reform and liberalisation the mobile market penetration took-off. Also, mobile broadband has emerged as the dominant form of broadband access accounting for 99 per cent of internet subscriptions.



Sources: <http://www.itu.int/ITU-D/icteye/> and <http://www.cck.go.ke/>

As with the fixed network, [digitisation](#) is presenting mobile operators with the same challenge to traditional business models. In the case of mobiles, both voice and text messaging revenues can be diluted by [apps](#). Since digitisation has separated access and services, in emerging business models access must 'pay its own way' and cannot rely on cross-subsidies from services. Of course, this may make affordable universal access harder to achieve and presents a policy challenge.

The digitisation of mobile networks puts capacity pressures on both mobile 'access networks' (spectrum) and 'backhaul' (transmission networks). The availability of spectrum is considered in [Section 6.3](#). For backhaul, mobile networks have relied on microwave to connect base stations but with increasing volumes as traffic moves from voice to data, transmission will have to be carried by fibre.

Policy makers have been generally sympathetic to infrastructure sharing where mobile operators seek to share the extra sites required to migrate to new technologies and accommodate increased traffic.

Unbundling of the kind seen on fixed networks has not generally been applied to mobile networks. Mobile operators have not been obliged to accommodate call competition with carrier or call selection [3] and the nearest equivalent to unbundled local loop and bitstream access, which is the [MVNO \(6.6\)](#), is not usually mandated.

END NOTES

[1] Where issues are covered in depth in other Modules. For example, as wireless telecommunications increasingly becomes a substitute for fixed services, regulators may have to rethink how to achieve [universal service](#) goals. This may involve a combination of fixed and wireless technologies. This section looks only at how issues affect competition and pricing.

[2] Mobile broadband can occur in many different ways including USB dongles (plugged into a USB connection), mobile data cards (plugged into a PC card slot), laptops with in-built modems, tablet devices (eg the Apple iPad), mobile handsets acting as modem ('tethered') to a laptop PC and directly from mobile handsets (smartphones).

[3] Jordan mandated wholesale access for international call origination for mobiles in March 2005. Due to technical issues, the regulator (TRC) halted the implementation process. But, in December 2010 the TRC decided that the leading mobile operator, Zain, should implement call and carrier selection for international calls on its mobile service

6.2 Key Concepts

A key difference between fixed and mobile networks is the technology used in the customer access network. The fixed network uses copper or fibre (or both) to provide wired connections. Mobiles use radio spectrum to connect the end-user; mobiles are 'wireless access lines'.

- [Spectrum \(6.3\)](#) is made available across different frequency bands for many different purposes. Lower frequency bands are suitable for mobile coverage and higher frequency is used to support capacity (eg video).
- **2G, 3G and 4G** are successive 'generations' of mobile technology. 2G is voice and 3G is a combination of voice and data and 4G is designed expressly for (IP) data (see **Telstra's path to 4G**). (1.5.2)
- [Interconnection \(6.4\)](#) is similar to the fixed network except where RPNP applies.
- **RPNP** (Receiving Party Network Pays) is less common than CPNP (Calling Party Network Pays) and does not apply in fixed networks.
- [BAK \(6.4\)](#) or 'bill and keep' is associated with RPNP and is similar to **peering** (3.1.2) in the internet.
- [SIM \(6.7\)](#) (Subscriber Identity Module) card is used in all GSM mobiles. Multiple SIM cards allow the same phone to be used on different networks.
- **MVNO** (Mobile Virtual Network Operator) is a form of [infrastructure sharing \(6.6\)](#) used by entrants without spectrum and using varying amounts of other capacity.

6.3 Spectrum Policy

In developed countries, access to spectrum for mobiles is more of an issue than for developing countries where making spectrum available in developing countries may be less costly and is typically is used less intensively [1].

A key issue for wireless due to the growth in mobile data traffic is access to more spectrum. [Radio Spectrum Management](#) is covered in another Module. Here, we focus on competition and pricing. The choice of spectrum is important because it affects the cost of equipment (and hence the price of services), coverage (universal service objectives) and inter-operability.

In the US and Europe a major source is the spectrum released in the migration from analogue to digital television; the [digital dividend](#). More recently, there has also been interest in making more effective use of broadcast television spectrum with the US being the first country to allow the unlicensed use of [white spaces](#).

Mobile's need for spectrum is a direct result of the growth in data services; in particular, video which takes up a lot of bandwidth.

Box 6.3: Australian spectrum restrictions

Australia has tried restricting access to spectrum to encourage market entry. The Government gave itself this ('competition limits') power in 1997 when Australia already had three established mobile operators (Telstra, Optus and Vodafone).

Although two entrants did emerge, they did not survive: OneTel went into receivership and Hutchison has merged with Vodafone.

The Productivity Commission, which reports to the Treasury, recommended that the power to exclude operators from spectrum auctions should be removed as '*unnecessary, potentially distortionary and procedurally deficient*'. However, the recommendation was rejected by the Government in December

2002.

Source: Productivity Commission, Radio Communications Inquiry Report, 2002

The price of spectrum can also have a bearing on competition because some auctions have crippled operators who paid too much for spectrum. In developing countries, there may be more public benefits in seeing spectrum used well than getting high prices for spectrum; which leads to other methods of allocating spectrum (e.g. ‘beauty contests’ where applicants explain how they would use any allotment of spectrum).

Box 6.4: Awarding 3G licences in Morocco

The regulator in Morocco ran a ‘beauty contest’ in 2006 awarding three 3G licenses. The results were astounding – mobile broadband subscriptions increased 530 per cent between 2007 and 2008.

Bidders included Maroc Telecom, Méditel, WANA (Maroc Connect at the time) and Maroc Nejma (a Kuwait-based company). The evaluation was based on four criteria: 1) deployment of infrastructure, 2) service quality engagement, 3) diversity, innovation, and incentive packages to customers, and 4) financial viability of bidder and shareholder relations.

The aspiring new entrant WANA made a great impression and was ranked first, followed by Maroc Telecom and Méditel. WANA’s launch of its restricted mobility service (branded as Bayn) in 2007 and full mobility service (branded Wana Mobility) in 2008 expanded mobile broadband as well as its own public reach and penetration.

When the company launched WANA mobility using CDMA technology (not the GSM standard that Méditel and Maroc Telecom used), they gave away free phones (two for the price of one). The promotion was so popular that WANA sales exceeded expectations and the company faced two major challenges: 1) a still under-developed infrastructure that could not handle the burden of so many users at once, and 2) technology incompatibility resulting in unexpected roaming issues (most neighbouring countries were using GSM). Eventually, many of the customers switched back to Maroc Telecom and Méditel.

Since 2010, WANA has been recapitalized by the Zain Group, changed management, and adopted a new brand name; INWI which claims the greatest 3G coverage, providing CDMA2000/EVDO for all new customers and 1X (an IMT-2000 technology but slower) where coverage areas have not yet been enhanced with EVDO technology.

Source: Broadband in Morocco: Political Will Meets Socio-Economic Reality, info/DEV October 2011

END NOTES

[1] But developing countries still need to plan ahead for the growth in mobile voice and broadband services. It has been suggested that when planning the next generation of services to be rolled out in Africa, regulators can enable their mobile network operators to cover both urban and rural areas by allocating higher frequency spectrum to provide capacity, and lower frequency spectrum to provide coverage. Source: Digital Dividend in Africa. Ross Bateson, GSM Association, ITU Regional Development Forum, Gambia, July 2010

6.4 Interconnection

The interconnection issues associated with mobiles depend on which of two charging regimes apply. Most countries use Calling Party Network Pays (CPNP) but a few countries (e.g USA and Canada) apply Receiving Party Network Pays (RPNP) which allows for bill and keep (BAK) payment systems where there are no inter-operator payments (end users at each of the call may pay a fee to their respective operators) [1].

IP interconnection will eventually replace switched interconnection as new mobile technologies are data-centric and data traffic is becoming more significant than voice traffic. The transition will be harder for operators in CPNP countries if voice interconnection rates are high because IP interconnection is very cheap.

There is no access pricing issue with RPNP because there are no wholesale termination charges. The end-user placing the call pays the operator providing the mobile phone without the operator completing the call receiving any payments (BAK).

BAK is now finding favour as a possible wholesale charging arrangement in both fixed and mobile next generation networks for IP interconnection (see sections [3.1.2](#) and [4.3](#)) because it is similar to 'peering' on the internet. This regime also reduces the amount of interconnection issues that a regulator has to deal with.

The Australian regulator asked the industry if would consider moving to BAK [2]. But the majority of stakeholders preferred a uniform approach to regulating MTM and FTM termination. One concern was the risk of arbitrage which arises if traffic originating on a fixed network is presented by an access seeker as mobile-originated traffic. Such traffic would be terminated at zero price under a BAK system while fixed-originated traffic would normally be charged at the FTM termination rate. There are potentially significant costs associated with monitoring arbitrage activities and rectifying their consequences.

For CPNP countries the cost of terminating traffic on mobile networks continues to be a key regulatory issue. Both main forms of mobile termination under CPNP may be regulated:

- Fixed to Mobile call termination (F2M)
- Mobile to Mobile network call termination (M2M)

Calls to the fixed network (M2F) are usually terminated at the same rates as fixed (F2F) calls.

A special case of M2M is machine-to-machine communication [3] which is rated more cheaply than person-to-person M2M calling and is not currently regulated; perhaps because machine-to-machine communications tend to be on-net services offered by an individual operator to an individual business.

The wholesale termination rate is usually the same for both F2M and M2M; which also has to deal with text messages (SMS, short message service) and MMS (picture and video transfer).

CPNP is generally believed to cause a market failure problem requiring regulation of mobile call interconnection. With CPNP, charges are ultimately borne by the customers of the originating operator and there is no competitive pressure on the terminating operator to constrain its wholesale charges [4]. Price controls imposed on wholesale mobile termination have been justified on the basis that a high mobile termination rate:

- is due to each mobile network operator having monopoly power over the termination of calls on its network
- leads to high retail prices, as the termination fee generally sets a floor on the retail price which discourage calling ;

- makes it harder for a much smaller mobile competitor to expand because of the additional cost that is linked to off-net calls;
- makes it harder for smaller mobile competitors to grow because larger networks have more extensive off-net calling opportunities to offer customers.

Where there is a large fixed network, mobile operators have used high F2M termination rates to promote mobile adoption through cheap SIM cards and handset subsidies. However, in many developing countries the fixed network is often not large so the fixed network cannot provide cross subsidies to mobile users (and is not recommended anyway).

In the Mobile to Mobile (M2M) context, mobile networks typically price on-net calls lower than (off-net) calls to other networks. If M2M termination rates are high, larger mobile networks are more likely to attract customers in a sort of ‘club effect’: to get cheaper calls, customers select the mobile operator that the people they call most also use. Without regulation, an operator could increase its termination rate to generate more revenue without affecting its own customers. The new revenue could be used to offer deeper on-net discounts to attract more customers which then generate more incoming calls and more revenue for bigger on-net discounts and so on.

Box 6.5: Namibia M2M disputes

MTC is the largest of the three mobile operators with about 85 per cent of the mobile market. It has tried to use its dominance to maintain its position in two ways; which have both been remedied by regulatory intervention.

MTC used high M2M termination charges to offer low on-net call charges to its customers. In 2008, the M2M rate was N\$1.06 and MTC charged its customers N\$2.5 for off-net calls compared with N\$1.79 charged by its nearest rival (CellOne, rebranded later as Leo). Since most customers were already on MTC, this created a ‘club effect’. Keeping its retail prices high caused traffic imbalances with the other network operators (both fixed and mobile) making net interconnection payments to MTC.

Following complaints and a benchmarking exercise, in July 2009 the regulator forced the M2M rate down to N\$0.60 immediately (equal to the fixed termination rate) and required it to fall to N\$0.30 (about 4 US cents) by the beginning of 2011. This removed the justification for the different retail prices between on-net and off-net calls.

But MTC did not pass through falls in M2M wholesale charges to the retail prices its customers paid to call off-net customers. Unless customers can move easily to other mobile networks, the ‘club effect’ continues because the difference in on-net and off-net retail charges is maintained. So in February 2011 the regulator prohibited different retail prices for these two types of calls.

Despite dire warnings from MTC about the impact of these changes on its profitability and ability to invest, MTC has continued to prosper.

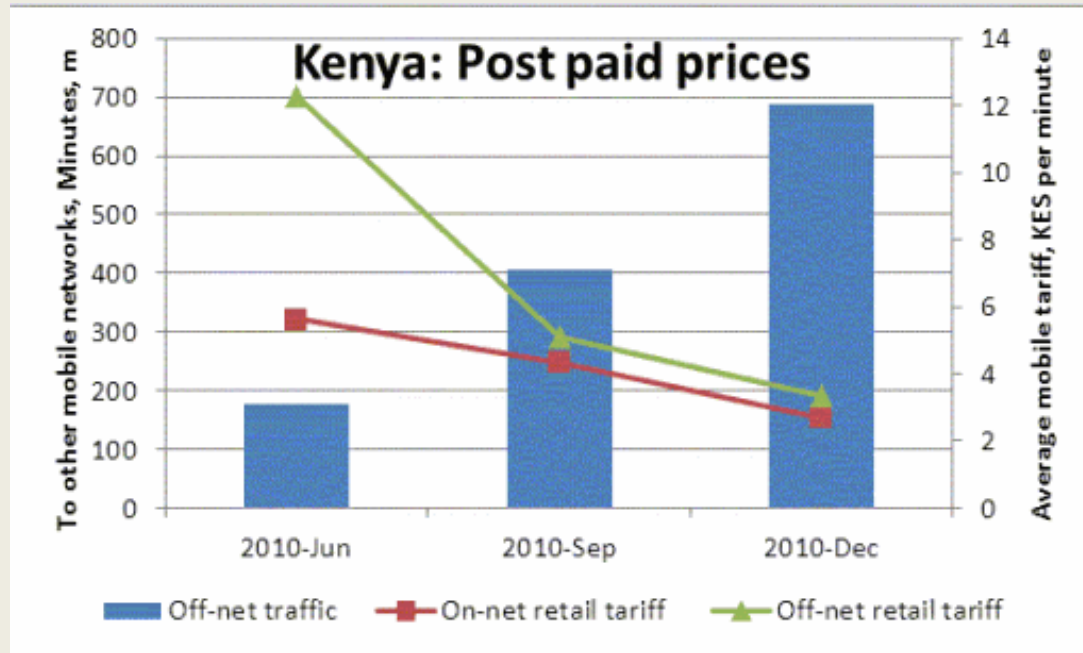
Sources: Namibian Telecommunication Sector Performance Review, 2010

There is little cost justification for high mobile termination rates. Reducing mobile termination rates to cost leads to more traffic between networks increasing consumer welfare.

Box 6.6: Kenyan M2M rate cut

In Kenya, the regulator reduced the mobile termination rate from KES 4.42 per minute to KES 2.21 in August 2010 and this combined

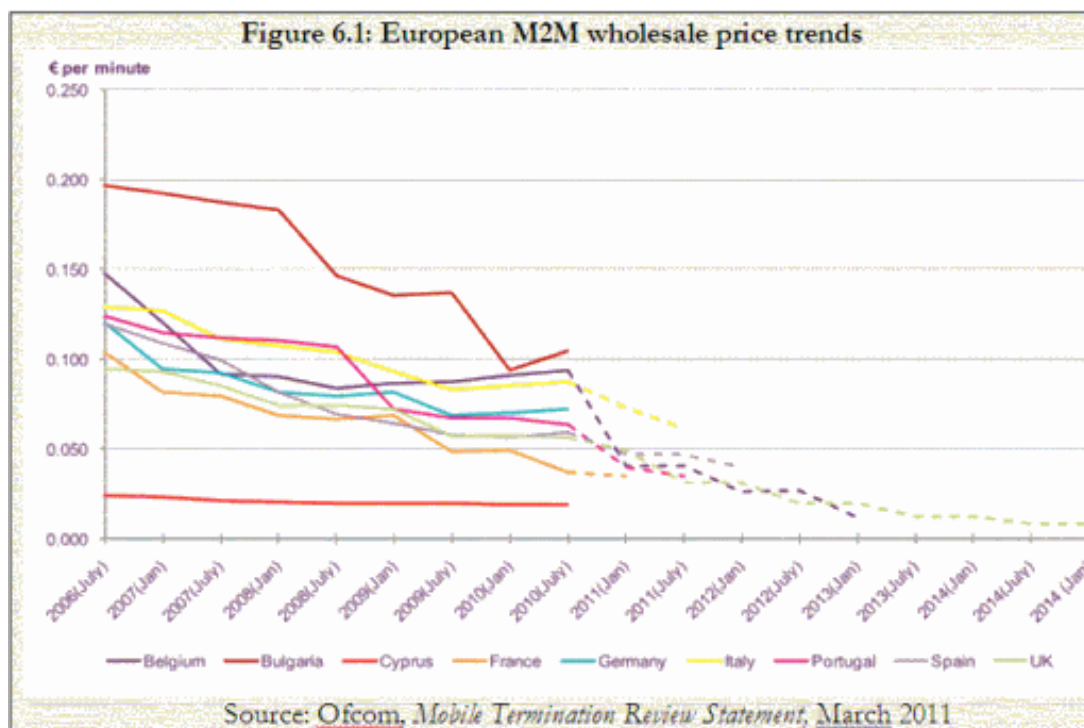
with increased mobile competition led to 70 per cent increase in calls to other mobile networks over 3 months compared with a 3 per cent increase in on-net call traffic.



Source: Sector Statistics Report, 2nd Quarter 2010/2011 www.cck.go.ke

Kenya does not have a large fixed network; and what it has is losing customers. At December 2010, there were just under 0.4 million fixed lines (of which, over half were fixed wireless) and 25 million mobile subscribers.

In 2008 mobile termination rates in Europe ranged from 2 eurocents per minute in Cyprus to 8 eurocents in Germany, over 10 eurocents per minute in Greece and almost 16 eurocents in Bulgaria. This fragmented price regulation was seen as a serious risk to creating a single borderless market for telecoms services in Europe and a real threat to Europe's competitiveness. As a result of an agreement in May 2009 on regulatory treatment of termination rates, they are required to fall to 'pure' [5] [LRIC](#). This is expected to result in rates between 1.5 and 3 eurocents by the end of 2012 [6].



END NOTES

[1] CPNP has been associated with rapid adoption rates as high mobile wholesale rates have been used to cross-subsidise access (handset prices and fixed charges) while RPNP has seen higher calling volumes per customer than CPNP regimes.

[2] ACCC Inquiry to make a final access determination for the Domestic Mobile Terminating Access Service (MTAS) - Access Determination Explanatory Statement, 7 December 2011

[3] Machine to machine communications essentially offers low-cost remote connectivity that is well suited to meters, monitoring instruments, retail inventory tracking, etc. In February 2011, Ericsson predicted that 50 billion devices would be connected in 2020.
<http://www.ericsson.com/news/1488399>

[4] Mobile operators in the UK argued that competition does prevail but Ofcom rejected their two major arguments. First, even if mobile communications constituted a [two-sided market](#), where both called and calling customers were retail customers, it did not believe that this consideration rose to the level of implying that mobile call termination was not a separate market for purposes of pricing. Second, Ofcom also rejected the cluster market argument that mobile providers competed for a customer's entire business, including calls that terminated to that customer so that any excess profits from mobile call termination are competed away as operators attempt to gain the customer's entire business. See the Mobile Call Termination Statement published by Ofcom in March 2007.

[5] 'Pure' LRIC leads to lower prices than LRIC that includes contributions to common costs.

[6] <http://europa.eu/rapid/pressReleasesAction.do?reference=SPEECH/09/222&format=HTML&aged=0&language=EN&guiLanguage=en> See also the ITU case studies of fixed-mobile termination for India, Finland, Mexico and China/Hong Kong SAR at <http://www.itu.int/osg/spu/ni/fmi/casestudies/>

6.5 Roaming

Roaming can be domestic or international. Operators normally pay a wholesale roaming charge (usually a charge per minute of use) in order to let their customers make or receive calls on another mobile network. Operators pass these roaming charges along to their

customers with a mark-up.

In the case of domestic roaming, a new entrant will seek arrangements with other operators to extend coverage to its customers into areas where it has no network. Since coverage can be an important differentiator between mobile networks, this is an arrangement that may not appeal to larger mobile networks [1].

National roaming is generally simpler and less costly to manage than active infrastructure sharing. But national roaming may lead to a greater degree of uniformity among operators' retail offerings. The roaming operator must rely on the choices made by the 'visited' operator running the network in that area. In addition, price competition may be restricted, since the retail tariffs charged by the roaming operator will be based, to a large extent, on the wholesale charges paid to the visited operator.

Box 6.7: Roaming in Germany

In 2002, T-Mobile and O2 notified the European Commission (EC) that they wished to allow roaming between their respective 3G networks in Germany. The EC argued that national roaming restricted competition because of its effect on coverage, roll-out, prices, and quality of service, especially in urban areas where there were good opportunities for the roll-out of competitive networks.

O2 challenged this decision before the European Court of First Instance (Court), claiming that there was no restriction of competition, and that the EC analysis of the effect of the agreement on competition was flawed.

In 2006, the Court agreed that the EC had not properly assessed the extent to which the agreement was necessary for O2 to enter the market. It found that the EC analysis had no objective discussion of what the competition situation would have been in the absence of the agreement, which distorted the assessment of the actual and potential effects of the agreement on competition. Also, the EC's claim that national roaming restricts competition was based on general statements about roaming agreements, not on concrete evidence specific to the agreement for that market. The EC also failed to demonstrate that any price dependence between the parties limited the freedom of O2 to set its prices on the market.

The Court considered that such a roaming agreement, rather than restricting competition between network operators, may actually increase competition by letting a small network operator (in this case O2) compete with a large one (in this case T-Mobile).

Source: [O2 \(Germany\) v. Commission](#)

Despite the concern about greater uniformity among operators' retail offerings, roaming may be the only alternative to bring coverage to a certain area. Roaming can make services more available and more affordable in many areas.

Box 6.8: Roaming for Universal Service in France

France provides an example of using roaming to extend mobile coverage throughout a country, including its rural regions. In 2006 the French government launched a programme called 'programme zone blanche' ('dead zone programme') aimed at providing mobile coverage in rural zones where operators had no coverage. The intention was to provide mobile coverage to 99 per cent of the French population by the end of 2007, covering more than 3,000 rural communities in France. Coverage in these areas may be achieved either through site sharing or through roaming. ARCEP's 2010 Annual Report says 2G mobile coverage now stands at 99.9% of the population, which means there are virtually no more dead zones and fewer and fewer 'grey areas' where only a single operator is present.

Source: [ARCEP, Annual Report 2010](#)

International roaming is a monopoly like [mobile terminating access \(section 6.4\)](#) but is more complicated because of the international dimension: national regulators generally have little or no control over bi-lateral agreements between mobile operators in different countries. Because these terminating rates are harder to regulate down, multi-country operators have an opportunity to generate 'club effects'. For

example, in 2006 Celtel (Zain) introduced 'borderless roaming' across its customers in Kenya, Tanzania and Uganda so they did not have to pay roaming charges to make or receive calls and they had the ability to top up their calling credit in any country.

International roaming is an important issue for the European Community which is creating a borderless market. It wants to create a stand-alone market for [international roaming \(section 6.5\)](#) with wholesale terminating prices regulated to the average of mobile terminating rates across the EU. Mobile customers would then have the right to opt for independent roaming services without having to change their number.

END NOTES

[1] In Australia, the regulator mandated mobile resale of the existing AMPS mobile network while the new entrants Optus and Vodafone built their respective GSM mobile networks. Telstra also had to build a GSM network as its existing AMPS network had to be closed when the GSM networks were complete. Only Optus took-up the AMPS resale option to grow a customer base and ran advertisements that claimed "unbeatable network coverage". This was actually true because it was using the only operational mobile network available.

6.6 Infrastructure Sharing

There are some benefits that apply to almost all forms of mobile network sharing [1]. Network-sharing agreements generally benefit operators and the general public from a cost perspective. Network sharing helps operators to attain more efficient coverage, since operators may choose to use only those sites that provide deeper and better coverage, decommissioning sites with poor coverage possibilities. Operators can then reinvest those savings in upgrading their networks and providing better coverage and services to end users.

Passive infrastructure [2] sharing is usually encouraged. Wireless communication masts and antennas can be unsightly and local communities may object to the construction of new sites because of the visual impact or because of the fear of public exposure to electromagnetic fields around masts and antennas. Site sharing can limit such concerns [3] and potential negative effects. Another beneficial aspect of site sharing is the amount of energy that can be saved when operators share electrical power, which is often in limited supply in developing countries.

Site sharing can also speed up network deployment and make it less expensive. In the European Union, for example, 2G networks were deployed in the 900 megahertz (MHz) spectrum band, while 3G licenses were assigned in the 1900-2100 MHz band. Because spectrum generally has a shorter range at higher frequencies, 3G networks require more base stations (and therefore more sites) – a significant transition expense for 2G operators. However, if those 2G operators can co-locate 3G equipment on each other's existing 2G towers, they can enjoy significant savings as a result.

Active mobile infrastructure [4] sharing may not be permitted under the licensing regimes of some countries. This is the case in India, for example, where the licensing regime for mobile telecommunications does not permit active sharing. Other regulatory agencies may allow active sharing only with strict conditions, in the belief that competing operators should utilize their own infrastructure independently.

Box 6.9: Ofcom's concerns with infrastructure sharing

"Network sharing could also have undesirable consequences for competition. For example, [mobile network operators] could collaborate on network development and gain information about each other's costs and plans, which may have a chilling effect on competition in the retail market. Dynamic efficiency may also be lower with fewer networks able to provide high quality mobile broadband services. End-to-end competition, i.e. at both the network and service level, could lead to greater innovation, which could bring significant benefits for consumers. We note that the

competition concerns would be amplified if the 900 MHz operators were themselves to decide to share a single UMTS 900 network in response to the actions of their competitors. While it is difficult to quantify the potential impact of these effects, Ofcom's initial view is that there is a significant risk that both competitive intensity and innovation in mobile broadband services would be weakened, with potentially serious impacts on consumer welfare."

With the merger of [Orange and T-Mobile](#) (Box 2.10) as Everything Everywhere, the number of national mobile operators dropped from 5 to 4 (the others are Telefónica, Vodafone and H3G). To ensure that this number does not drop any further, Ofcom is proposing to structure spectrum auctions to guarantee 4 competing national networks.

Sources: Ofcom, Application of spectrum liberalization and trading to the mobile sector, 20 September, 2007 and
Ofcom's second consultation on assessment of future mobile competition and proposals for the award of 800 MHz and 2.6 GHz spectrum and related issues, 12 January 2012

Generally speaking, network sharing is a useful tool for regulators and policy makers who want to encourage network deployment in unserved or under-served areas. Several instruments can be used to promote network sharing. National roaming arrangements are probably the most simple and effective arrangements. While roaming leads to a certain level of uniformity among operators' offerings, this does not necessarily restrict competition significantly. National regulatory authorities that have anti-competitive concerns may allow network sharing for a limited period (for example, one or two years) in order to promote roll-out of initial phases of network deployment. After that, operators could be required to provide coverage using their own networks.

A more complex form of sharing is the mobile virtual network operator (MVNO). The types of MVNO range from resale to bulk buying:

- The resale end of the market buys the existing suite of products and services off the provider at a small discount and resells them under their own name. It is little more than a rebranding exercise and does nothing beyond raising the MVNO's profile in the mobile market segment.
- The true MVNOs buy minutes, texts and data in bulk and provides its own SIM card to its customers. The level of investment required by the true MVNO is much higher - they need to hire a product team and have billing capability for instance - but the rewards are also much greater. They get more control and they should get a better margin.

MVNOs first appeared in Denmark, Hong Kong, Finland and the UK and today exist in over 50 countries, including most of Europe, United States, Canada, Australia and parts of Asia, and account for approximately 10% of all mobile phone subscribers around the world.

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END NOTES

[1] The key reference document for mobile infrastructure sharing is [GSR 2008 Mobile Network Sharing](#), by Camila Borba Lefèvre

[2] The passive elements of a mobile telecommunications network are the physical components of the radio access network that may not necessarily have to be managed or controlled by the operator after their installation. These elements include electrical or fiber optic cables, masts and pylons, physical space on the ground, towers, roof tops as well as shelter and support cabinets containing power supply, air conditioning, alarm installation and other passive equipment. The assembly of passive equipment in one structure is generally referred to as a 'site'.

[3] But, because antennas generally have to be separated from each other by a minimum distance in order to avoid interference, mast sharing usually requires taller (and more visually disruptive) masts. Local planning authorities actually may prefer several small towers to one large one. More discrete (or disguised) structures reduce visual intrusion, but cannot support more than one operator's antenna.

[4] The active elements of a wireless network are those elements are managed by operators, such as antennas, antenna systems, transmission systems, channel elements and others.

6.7 Enhancing Competition

While many markets can support mobile competition, regulation may be necessary to support the competitive process. Apart from stopping [anti-competitive conduct](#), there are some regulatory initiatives which could support a more competitive mobiles market.

With digitisation regulators will come under pressure to protect mobile operators from '[over-the-top](#)' applications that reduce the voice and text revenues that are significant for mobiles. However, mobile operators should be encouraged to adapt their business models to accommodate competition (see [Box 2.10](#)). These applications will make regulatory initiatives like mandated call selection redundant [1].

A regulatory instrument that has been used extensively to promote competition in mobiles is mobile number portability (MNP). European Law treats number portability as a human right under the EU Universal Service Directive that has applied since July 2003. But in other countries, especially smaller developing countries, the benefits and costs of implementing number portability should be considered carefully. The technical options employed in large markets for MNP may be too costly for small countries and they will be overtaken by technological changes which will change how we think about numbering and customer switching.

Box 6.10: Bahrain and MNP

The Telecommunications Regulatory Authority (TRA) got interested in mobile number portability in 2003 and decided to proceed in 2008 and implemented MNP in July 2011 (and fixed number portability in October 2011).

Mobile porting takes place within 1-3 days for mobile with subscribers given a new SIM card. The maximum porting charges will be BHD 4 (about US\$10).

The TRA, which is bearing the costs of the centralised system, is hoping that up to 20 per cent of mobile customers will exercise the MNP option.

Source: http://www.tra.org.bh/en/pdf/NP_LaunchPressReleaseEnglish.pdf

The SIM card that links each customer to a mobile operator can also present a barrier to switching [2]. On some networks, the mobile phone is 'locked' so that specific carrier's SIM cards will work. This is more common in markets where mobile phones are heavily subsidised by the carriers, and the business model depends on the customer staying with the service provider for a minimum term (typically 12 or 24 months). Common examples are the GSM networks in the United States, Canada, Australia, the UK and Poland [3].

In countries where the phones are not subsidised (e.g. Italy, India and Belgium), all phones are unlocked. Where the phone is not locked to its SIM card, the users can easily switch networks by simply replacing the SIM card of one network with that of another while using only one phone. Customers may swap SIM cards to

change an off-net call into an on-net call; or to access better international call rates on another operator.

END NOTES

[1] South Africa was proposing to become the first country to impose carrier pre-selection on all mobile networks but the postponed implementation date of 30 November 2011 seems to have been missed.

[2] The SIM holds personal identity information, cell phone number, phone book, text messages and other data. It can be thought of as a mini hard disk that automatically activates the phone into which it is inserted.

[3] However, many businesses offer the ability to remove the SIM lock from a phone, effectively making it possible to then use the phone on any network by inserting a different SIM card. Mostly, GSM and 3G mobile handsets can easily be unlocked and used on any suitable network with any SIM card.

7 Regulating Retail Prices

Before competition, price regulation was needed to correct monopolistic tendencies (i.e. restricting output and holding up prices) by the incumbent. This was usually done with rate of return regulation or with [price cap regulation](#) [1].

In the transition to competition, many countries kept some retail price controls to manage the price rebalancing that comes with the transition from monopoly to competition.

With competition, the regulatory focus shifts from regulating retail prices to access prices and maybe neither (e.g. if there is effective infrastructure competition); but not both. To protect competition, the regulator may still need to act to prevent anti-competitive conduct [2]. And, there may be cases where access price regulation alone is not effective (e.g. [mobile termination](#) in CPNP countries).

This section reviews,

- [Policy Issues](#)
- [Key Concepts](#)
- [Price Caps](#)

END NOTES

[1] Another possibility is government fiat. This occurs under state ownership where the regulator or government department establishes prices usually after consultation with the management of the enterprise.

[2] Among the retail pricing issues considered under chapter on [anti-competitive conduct](#) are the vertical [price squeeze](#), [cross-subsidisation](#), [predatory pricing](#) and [tying/bundling](#).

7.1 Policy Issues

Before the development of effective competition (e.g. state owned monopoly operators) the regulatory concern is that prices will be set substantially above cost so that the operator earns a monopoly level of profit. Wholesale prices are not relevant because there is no competition. With monopoly, the regulatory focus is on regulating retail prices to get the outcome one would expect if the market was competitive.

When regulating either access or retail prices (or both), regulators observe the principles of [economic efficiency](#) because that leads to the outcomes we expect in a competitive market.

But regulators are expected to target not only economic efficiency objectives but also politically determined social equity objectives which may include:

- Managing [tariff rebalancing](#): An important outcome in the transition from monopoly to competition is the elimination of [cross-subsidies](#) through tariff rebalancing. Competition erodes cross-subsidies and incumbents would like to expedite this process by increasing unprofitable (subsidised) retail access prices in order to lower profitable long-distance call prices. But sudden tariff rebalancing is politically unacceptable. So, price caps, geographical averaging or other similar

schemes may be introduced to manage the impact of the necessary rebalancing and to ensure that rebalancing does not undermine the affordability of telephone services.

Whatever the benefits from subsidizing access prices, economists agree that rebalancing tariffs can produce significant economic gains. Tariff rebalancing meets economic efficiency objectives and can improve social welfare by stimulating demand for services such as long distance calling. Rebalanced prices provide improved signals to actual and potential service providers to invest in network access technologies and improve incentives for competitors to compete for a broad range of customers.

- **Maintaining geographically uniform prices:** It costs more to provide services in rural areas than in urban areas but for political reasons it may be necessary to insist that customers pay the same in any area. This social policy presents a clear conflict with economic efficiency principles. Retail price regulations may require this policy to be observed by the incumbent. Regulators setting cost-based prices may be tempted to set de-average wholesale prices which would pose problems for the incumbent (see [Box 4.1](#));
- **Affordability:** the traditional monopoly policy of cross-subsidising access from calls helped increase take-up of fixed services [1]. The fear that fixed services might become less affordable after tariff rebalancing has been mitigated by the rapid adoption of mobile services. Now the fear is that fixed broadband services may not be affordable after spending millions of dollars replacing copper with fibre.

Since cross-subsidy is no longer viable, policy-makers need to find other instruments to ensure affordability. These could include direct subsidies to disadvantaged users or to operators (after competitive tenders) to fund roll-out [2].

Where there is competition, the regulatory focus is on [access pricing](#) leaving to market forces driving retail prices – with two exceptions.

- First, there may be some politically mandated pricing constraints, for the reasons just mentioned. The regulator should be given directions by policy-makers for pricing that supports social objectives. Otherwise, the regulator should be guided by economic efficiency principles.
- Second, the incumbent may seek to use its market position to frustrate competition. The ways in which this may occur and how the regulator can remedy such behaviour are discussed in the section on controlling anti-competitive conduct [3].

Any other interventions to regulate retail specific prices are likely to distort markets.

Box 7.1: Australia Forbears Regulating Pass-Through

In markets with large fixed networks, there is sometime pressure on regulators to ensure that reductions in mobile termination rates are passed through to reductions in the retail prices paid by fixed customers to call mobile networks. This pressure is resisted.

For example, the Australian regulator was asked to mandate such pass-through in its ‘access determination’ for mobile termination. It has refused because it limits how fixed operators use the savings to pass on benefits.

Worse, in the Australian context where the ‘access determination’ is only used to avoid disputes, the existence of a mandatory pass-through requirement may incent fixed and mobile operators to settle on mobile termination rates that are higher than the access determination because a commercial agreement means the pass-through mechanism is not triggered.

And, even if there is a pass-through requirement is triggered, it could be circumvented by fixed line operators raising the pricing of other fixed line bundled services.

Source: ACCC Inquiry to make a final access determination for the Domestic Mobile Terminating Access Service (MTAS) - Access Determination Explanatory Statement, 7 December 2011

END NOTES

[1] This was also true of mobiles where access (the [SIM card](#) and calls were joint in supply and demand. Just as call/carrier selection broke the nexus between access and calls in the fixed network (and the viability of cross-subsidy), voice and SMS [apps](#) on mobiles are undermining traditional mobiles business models.

[2] Another possibility is to use licence condition to require pricing plans to assist low-income consumers to access telecommunications.

[3] Among the retail pricing issues considered under chapter on [anti-competitive conduct](#) are the vertical [price squeeze](#), [cross-subsidisation](#), [predatory pricing](#) and [tying/bundling](#).

7.2 Key Concepts

Key concepts include:

Rate of return regulation: this involves the regulator agreeing an allowed rate of return on capital. This allowed profit is then added to agreed operating and capital cost projections to establish the revenue needs of the regulated business. Given a forecast for the volume of sales in the regulated period, it is then possible to establish the permitted prices. [1]

Price cap regulation: the regulated business is given a price cap regime (with or without consideration of the rate of return), which provides some level of incentives for operators to function efficiently and reduce costs.

Sliding-scale regulation: Commonly under this method a price cap is set but if a firm's profits exceed a given level then the firm is expected to cut prices to consumers with immediate effect.

Tariff rebalancing seeks to increase access prices, and reduce prices for services that have traditionally subsidized low access prices. The objective is to ensure that the price for each service reflects the underlying cost of providing that service.

END NOTES

[1] This is actually the approach that the Australian regulator adopted in 2011 for access pricing when it moved away from [TSLRIC+ regulation](#).

7.3 Price Caps

Many approaches have been developed to regulate prices. Price cap is one of the most widely accepted ways of price regulation. It was designed as an answer to weaknesses in the rate of return regulation.

The UK was the first country to introduce price-cap retail price regulation and the first country to remove them. In narrowband (voice telephony), the introduction of suitable wholesale products, such as wholesale line rental (WLR), allowed Ofcom to abolish retail price controls in 2006 and remove ex ante retail price regulation

altogether in 2009.

Price cap regulation is sometimes called RPI-x regulation. It allows the operator to change its weighted average price level by the change in the retail price index (RPI) less a productivity factor (x). Sometimes, a price cap regime allows for exogenous price shocks (z) to be passed-on so the formula for the change in the price of the basket (P) is then,

$$P = RPI - x + z \quad \text{where these are all per cent changes}$$

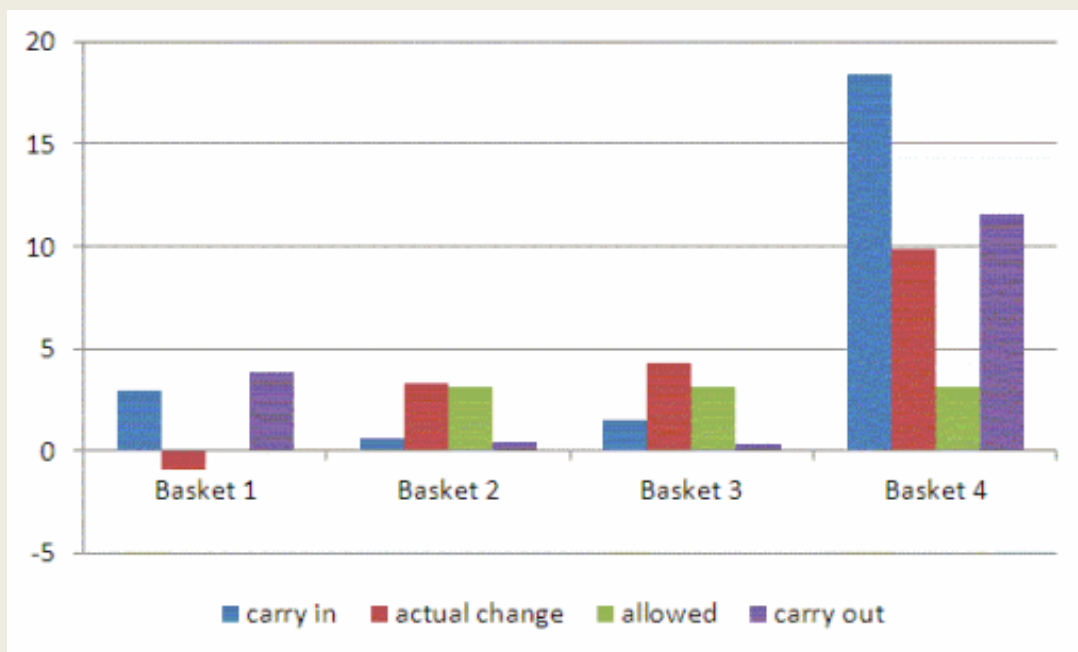
This is also known as incentive regulation because if the operator achieves greater efficiencies than required by x, it can retain the difference as increased profits. If it makes greater price cuts than are necessary to meet the formula in any year, it may be allowed to credit the surplus against changes required in the next period. This has been the case in Australia where retail price controls were first introduced in 1989.

Box 7.2: RPI-x in Australia

The details of the price cap change have changed between the many price control periods in Australia. But, the basic system with its control over the level of tariffs and the amount of tariff rebalancing is still intact until June 2012.

There is no overall basket but four separate baskets of services. The first basket of services consists of local calls, trunk (national long-distance and fixed-to-mobile) calls, international calls and line rentals. The second basket consists of Telstra's most basic line rental product offered to residential customers. The third basket consists of Telstra's most basic line rental product supplied to business customers and charity customers. The fourth basket consists of connection services.

The services in the first basket are subject to competitive pressure and x is set at the change in the RPI (CPI in Australia) so the weighted average of all services in the basket must not increase in nominal terms. In fact, in the year to June 2010 they fell 0.9 per cent overall (and just over 10 per cent for international calls). Tother with an unused credit from the previous year of 2.9 the carry forward credit was 3.7 per cent. Carry-forward credits have been abolished but this has been off-set by reducing x from RP to zero.



The remaining three baskets remain subject to a zero x and all saw actual price changes larger than RPI funded by unused credits brought forward from the previous year. However, the remaining carry-out credits have been abolished.

The current regime will expire in June 2012.

Sources: [ACCC Telstra's compliance with the price control arrangements: 1 July 2009 to 30 June 2010](#)

Price caps can be complicated to administer and simpler variants such as revenue caps are worth considering.