



## 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**

### 2.1.1 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).

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.

◀ **Box 1.1: Australia: Arbitrage of Local Calls**

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

**Practice Notes**

- **Forms of Arbitrage**

**Reference Documents**

- **ACCC, Final Access Determination for Fixed Line Services, July 2011**

**2.1.2 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\*. The EU applies the "three criteria test", all of which have to apply for a market to require *ex-ante* regulation\*:

	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

◀ **Table 1.1: The EU's Three Criteria Test**

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\*:

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

◀ Table 1.2: EU Markets Suitable for Ex-Ante Regulation

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:

- - **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\*. 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\*, 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\\_giance/KeyTelecom.html](http://www.itu.int/ITU-D/ict/statistics/at_giance/KeyTelecom.html)  
 3. <http://www.itu.int/ITU-D/ict/material/FactsFigures2010.pdf>

Table 1.3: Differences Between Regions

Source: WorldBank/ITU

The policy focus in developed countries was originally on introducing competition in the call market, leading to the regulatory focus on switched interconnection\*. 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.

#### Practice Notes

- Digital Dividend Spectrum
- EU Telecoms Reform Package [1]
- Forms of Market Failure
- Network Neutrality
- New Zealand: Using Competition Law to Regulate Interconnection
- White Spaces Spectrum [1]

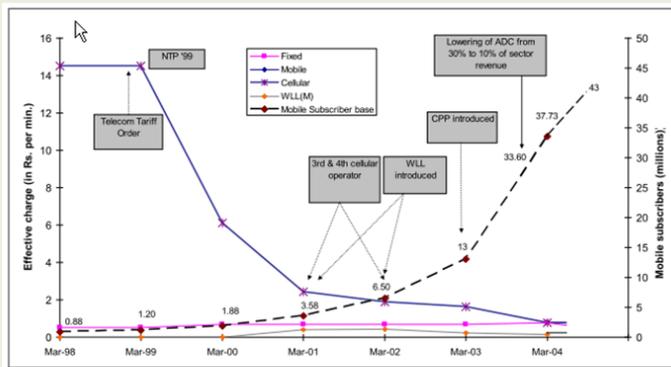
#### Reference Documents

- EU, Commission Recommendation of 17 December 2007 on relevant product and service markets within the electronic communications sector susceptible to ex ante regulation
- European Regulators Group -- ERG Report on Guidance on the application of the three criteria test (June 2008)
- GSR 2010 Discussion Paper, 10 "The impact of broadband on the economy: Research to date and policy issues"

### 2.1.3 REGULATORY ISSUES

As indicated in Section 1.2, regulation is an instrument of policy. Regulation takes second place to competition\*. 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\*.

Box 1.2: The Benefits of Competition: India



Source: Fig 1.5 in ITU Telecoms Regulation Handbook, 2011

FIGURE 2.1: The Benefits of Competition: India

Source: Fig 1.5 in ITU Telecoms Regulation Handbook, 2011

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<sup>4</sup> 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<sup>5</sup>. Where intervention is required, Ofcom aims to intervene firmly and promptly, using the least intrusive regulatory mechanisms available. It has seven "**regulatory principles**".

#### Practice Notes

- **Forms of Competition**
- **Forms of Market Failure**
- **Jamaica: The Benefits of Mobile Competition**
- **Ofcom: Principles for Regulation**
- **Regulatory Forbearance in Canada**

#### Reference Documents

- **Kenya – Broadband Case Study: Build It and They Will Come**
- **Telecommunications Regulation Handbook**

### 2.1.4 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**

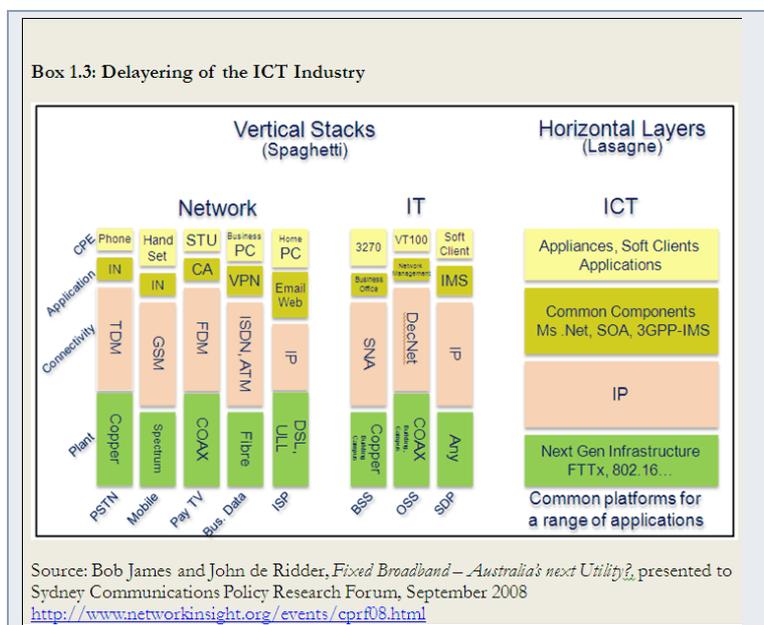
## Reference Documents

- **Asia-Pacific: Telecommunications Regulation - Competition - ICT Access**

### 2.1.4.1 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.

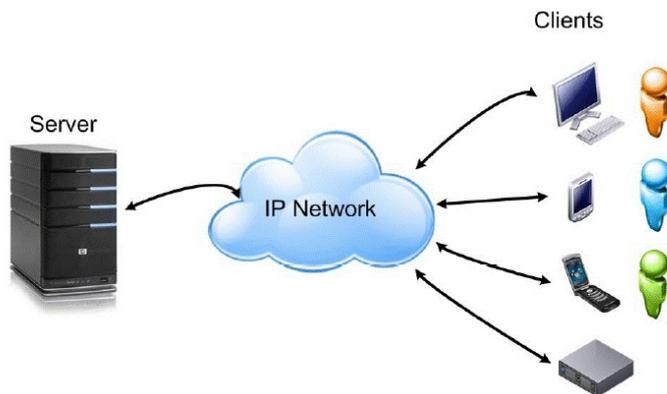
The most fundamental shift behind all these changes is the transition to all-digital networks which has profound implications for competition and regulation. Networks used to be built vertically around specific applications (eg voice or PayTV) but digitisation 'de-layers' networks (Box 1.3) so that content or applications are no longer network specific. A byte is a byte and Next Generation Networks are layered to serve all applications.



◀ **FIGURE 2.1: Delayering of the ICT Industry**

Source: Bob James and John de Ridder, *Fixed Broadband - Australia's next utility?*, presented to Sydney Communications Policy Research Forum, September 2008  
<http://www.networkinsight.org/events/cprf08.html>

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 2.2: NGNs Combine All Digital Networks

## Reference Documents

- [Telecommunications Regulation Handbook](#)

### 2.1.4.2 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.

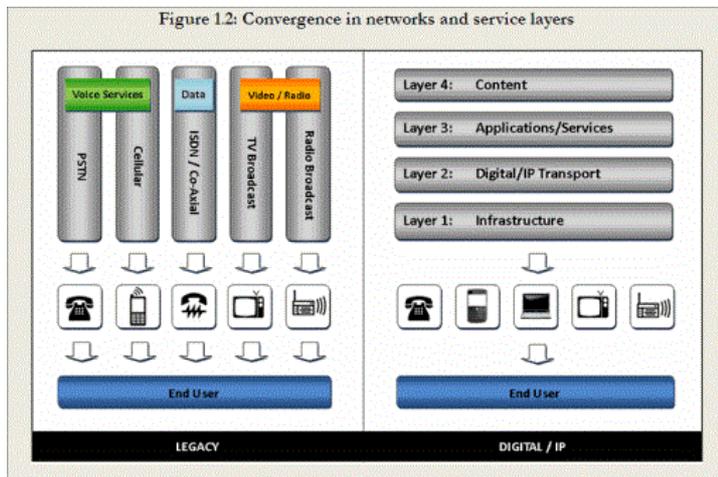
## Reference Documents

- [Australia: Developments in next generation applications and services, ACMA](#)

### 2.1.4.3 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<sup>\*</sup>:

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 2.3: Convergence in Networks and Service Layers

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.

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).

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.

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

#### ◀ Box 1.4: Mobile Money

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.

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.

## Reference Documents

- [ACMA: Converged Legislative Frameworks](#)
- [Broken Concepts: The Australian communications legislative landscape](#)
- [ITU, Regulatory Impact of Convergence and Broadband for the Americas". Connect Americas Summit, July 2012.](#)
- [Telecommunications Regulation Handbook](#)

### 2.1.4.4 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<sup>\*</sup> 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<sup>\*</sup> and sought by Deutsche Telekom<sup>\*</sup>
- 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<sup>\*</sup>.

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.

#### ◀ Box 1.5: Public Investment

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 the 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.

**Practice Notes**

- **Forms of Market Failure**

**Reference Documents**

- **UK: Models for efficient and effective public-sector interventions in next-generation broadband access networks**

**2.1.5 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**

**2.1.5.1 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<sup>\*</sup> 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<sup>\*</sup>.

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.

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

◀ **Figure 1.3: Retail Arbitrage Model (Resale)**

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<sup>\*</sup>.

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.

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

◀ Figure 1.4: Switched Reseller Model

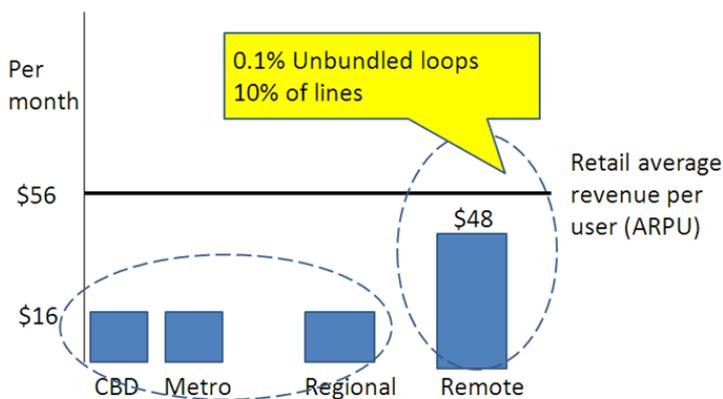
In this model (Figure 1.4), the entrant provides long-distance services by inviting its customers to preselect it for long-distance calls and pays the incumbent for originating and terminating interconnection at each end of its transmission network. Its profit margins improve compared with resale. The 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.

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

◀ Figure 1.5: Unbundled Local Loop Model

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\*. 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\* 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\*. 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.

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

◀ Figure 1.7: Facility Based Model (Fibre)

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.

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

◀ Figure 1.8: Mobile Model

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.

#### Reference Documents

- [ACCC, Final Access Determination for Fixed Line Services, July 2011](#)
- [Berkman Centre for Internet and Society, Harvard: Next Generation Connectivity](#)

#### 2.1.5.2 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\*. 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.

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.

#### ◀ Box 1.5: Fibre access as capital works projects

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.htm>

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\* to offer 4G mobile telephony (Table 1.4).

Service	Year	Features	Down*	Up*	Population Coverage
1G	1987	Analogue for voice	n/a	n/a	96%
2G	1993	First digital phone, <a href="#">sms</a>	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%

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

Source: Telstra

\*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.

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

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 \*.

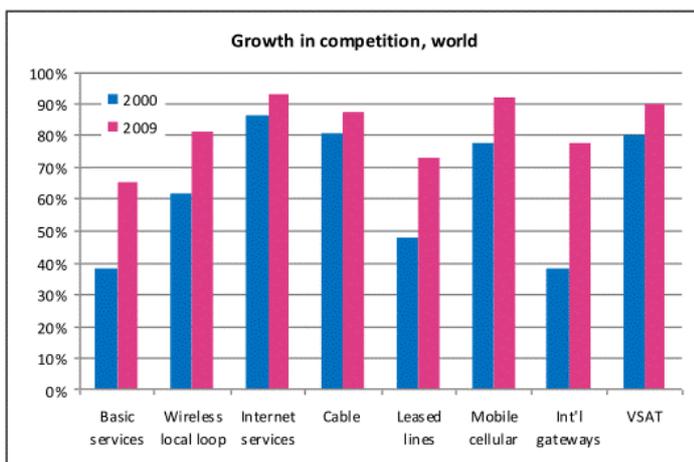
## Reference Documents

- [Berkman Centre for Internet and Society, Harvard: Next Generation Connectivity](#)

### 2.1.5.3 LEVEL OF COMPETITION GLOBALLY

Over the last decade, many countries have opened-up various telecoms markets to new entrants. According to ITU data \*, 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.

## Reference Documents

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- [Telecommunications Regulation Handbook](#)

[Next: 2.2 Anti-Competitive Conduct →](#)

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