

REGULATORY & MARKET ENVIRONMENT

REGULATING BROADBAND PRICES

Broadband Series



A P R I L 2 0 1 2
Telecommunication Development Sector



Regulating Broadband Prices

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This study on Regulating Broadband Prices was prepared by Mr Jim Holmes and Mr Matthew O'Rourke from *Incyte Consulting*, under the direction of the Regulatory and Market Environment Division (RME) of the Telecommunication Development Bureau (BDT).

This report is part of a new series of ITU reports on broadband that are available online and free of charge at the ITU Universe of Broadband portal: www.itu.int/broadband.



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Preface

The past twenty years has been an extraordinary time for the development of information and communication technologies (ICTs) – and with the ‘mobile miracle’ we have brought the benefits of ICTs within reach of virtually all the world’s people. ITU has been in the forefront of this transformational ascent and is today committed to continue to driving positive change in the sector and beyond. It is now time to make the next step, and to ensure that everyone – wherever they live, and whatever their circumstances – has access to the benefits of broadband. This is not just about delivering connectivity for connectivity’s sake – or even about giving people access to the undoubted benefits of social communications. It is about leveraging the power of broadband technologies – and especially mobile technologies – to make the world a better place.

In 2010, ITU, in conjunction with UNESCO, launched the Broadband Commission for Digital Development – to encourage governments to implement national broadband plans and to increase access to broadband applications and services. The Commission is co-chaired by President Paul Kagame of Rwanda and Carlos Slim, President of the Carlos Slim Foundation. We have around 60 Broadband Commissioners – all top-level leaders in their field – representing governments, industry, academia and international agencies. At the Broadband Leadership Summit held in October 2011 in Geneva, the Broadband Commission recognized broadband as a critical modern infrastructure contributing to economic growth and set four clear, new targets for making broadband policy universal and for boosting affordability and broadband uptake. Out-of-the-box models that promote competition, innovation and market growth are now needed to make the broadband opportunity reachable for all world citizens.

At ITU, the United Nations specialized agency for ICTs and telecommunications, we are committed to playing a leading role in the development of the digital economy through extending the benefits of advances in broadband and embracing the opportunities it unleashes. The three ITU sectors – Radiocommunications, Standardization and Development – are working together to meet these challenges and our collective success will be a key factor in ensuring the provision of equitable broadband access throughout the world. The ITU Broadband Reports are one contribution towards this commitment.

Dr. Hamadoun I. Touré
Secretary-General, ITU

Foreword

Broadband has become a key priority of the 21st Century, and I believe its transformative power as an enabler for economic and social growth makes it an essential tool for empowering people, creating an environment that nurtures the technological and service innovation, and triggering positive change in business processes as well as in society as a whole. Increased adoption and use of broadband in the next decade and beyond will be driven by the extent to which broadband-supported services and applications are not only made available to, but are also relevant and affordable for consumers. And while the benefits of broadband-enabled future are manifest, the broadband revolution has raised up new issues and challenges.

In light of these developments, ITU launches a new series of ITU Broadband Reports. The first reports in the series launched in 2012 focus on cutting edge policy, regulatory and economic aspects of broadband. Other related areas and themes will be covered by subsequent reports including market analysis, broadband infrastructure and implementation, and broadband-enabled applications. In addition, a series of case studies will complement the resources already made available by ITU to all its many different types of readers, but especially to ICT regulators and policy-makers.

This new series of reports is important for a number of reasons. First of all, the reports will focus on topical issues of special interest for developed and developing countries alike. Secondly, the various reports build on ITU's recognized expertise in the area augmented by regular feedback from its Membership. Last but not least, this series is important because it provides a meaningful contribution to the work of the Broadband Commission for Digital Development. The findings of the ITU Broadband Reports will trace paths towards the timely achievement of the ambitious but achievable goals set recently by the Commission as well as provide concrete guidelines. As broadband is a field that's growing very fast, we need to constantly build knowledge for our economies and societies to thrive and evolve into the future.

For these reasons, I am proud to inaugurate this first series of the ITU Broadband Reports and look forward to furthering ITU's work on the dynamic and exciting broadband ecosystem.

Brahima Sanou

Director, ITU Telecommunication Development Bureau

1 Introduction

The affordability and accessibility of broadband services are largely determined by the prices that are charged for those services. The regulation of prices can thus be a very tempting prospect for policy-makers and regulators who want to increase the adoption and use of broadband services at the earliest time. However, price intervention in broadband markets is a risky proposition and potentially damaging to the long-term development of those markets.

There are two main reasons for this. Firstly, broadband markets generally are not yet mature and demand for some applications remains uncertain and fragile. Secondly, the methodologies and regulatory mindsets that have been developed for price regulation in narrowband markets do not suit the new broadband environment. Applying those legacy regulatory practices in broadband markets, even where it is possible to do so, can distort price signals and investment incentives. This in turn can make the true demand even more unclear and dissuade the investment in broadband infrastructure that is necessary to ensure the long-term development and effectiveness of broadband markets.

The notion that broadband markets have not yet reached maturity may seem counterintuitive given that, at least in developed countries, penetration is quite high and utilisation has infiltrated many daily routines. Some countries have even built national next generation access broadband networks and directly connected residential and business premises with fibre optic cables. However, it is important to distinguish between the physical broadband access connection (which is measured by penetration statistics) and the utilisation and application of the bandwidth capacity of the actual broadband service. The latter has considerable potential, ranging from applications that are common today to innovative new applications, many of which involve substantial bandwidth and multimedia presentation. These applications of broadband technology provide service providers and others in the production, aggregation and distribution value chain with considerable revenue and growth potential and it would be premature to describe broadband markets as mature until that potential is more fully realised. Further, it would be damaging to the long-term development and effectiveness of those markets if they were regulated as if they were fully and finally matured.

The access and usage prices for fixed voice telephony have traditionally been subject to some form of regulation in most countries. Although that has provided regulators with many years of experience in telecommunications price regulation and the associated costing methodologies and principles, that experience is not necessarily useful and relevant to broadband markets and may even pose barriers to the development of those markets. Whereas narrowband markets were voice-centric and characterised by sunk investment costs, a simple supply chain, and known demand profiles, broadband markets are not service-specific, require considerable new investment in infrastructure and have unclear and evolving customer demand and expectations. Price regulation in this context is a very different proposition. A new regulatory paradigm needs to be developed.

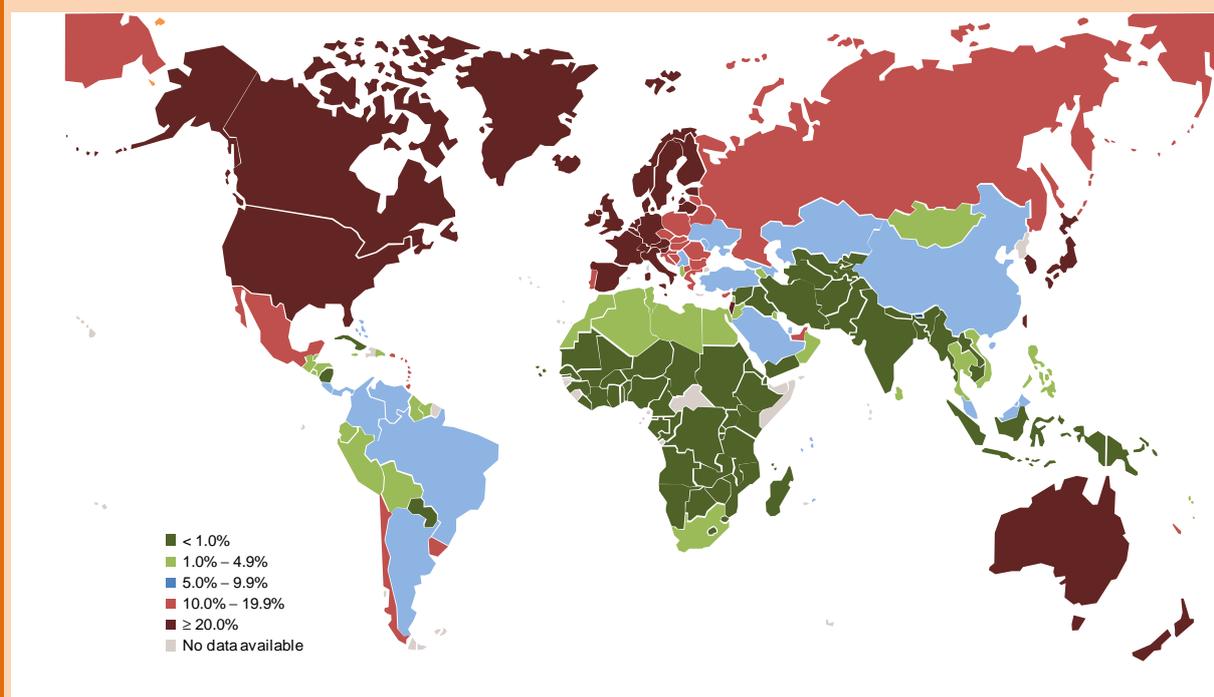
The premise of this paper is that regulators should refrain from regulating prices in broadband markets, particularly while those markets are still developing, further investment is still required, and demand remains uncertain. Wherever possible, reliance should be placed on the price clearance mechanism of competition, with ex post intervention if anti-competitive behaviour occurs. If some form of ex ante price regulation is necessary based on the identification of a specific market failure, that regulation should focus on relevant wholesale markets – ideally markets for access to passive infrastructure – as far upstream in the supply chain as practicable. This avoids the major complexities that would be involved in determining appropriate prices for wholesale access to active services. It would also best address the market dominance problems that can lead to excessive prices in the downstream retail markets.

Broadband suppliers need the flexibility to set and adjust their retail prices and price structures through trial and error. If some form of retail price regulation is considered necessary to help achieve broadband penetration objectives, it should be limited to broadband products that are the lower capacity entry levels for most users. This would ensure that a basic broadband service is universally affordable while retaining flexibility for service providers to experiment and be creative with their retail pricing.

2 The regulatory challenges of broadband

Revolutionary developments in broadband technologies and markets are creating many policy challenges for regulators. Chief among these are issues of broadband access and availability. National governments everywhere are embracing the potential of broadband as a key enabler of national productivity, economic growth and development, social inclusion and cultural enrichment. However, although the penetration of fixed wired broadband services is generally increasing, as can be seen in Figure 1 it is still less than 5 per cent or effectively non-existent across much of the world. Further, as shown in Figure 2, the countries where the adoption of mobile broadband is greatest tends to be those countries where the penetration of fixed wired broadband is highest.

Figure 1: Penetration of fixed broadband services (2010)¹



Source: ITU World Telecommunications/ICT Indicators Database

¹ Data is sourced from, and available in, International Telecommunications Union (2009), *Measuring the Information Society: The ICT Development Index v1.01*, Annex 4.

Figure 2: Top broadband economies, early 2011

Economy	Fixed-broadband subscription per 100 inhabitants	Economy	Active mobile-broadband subscriptions per 100 inhabitants*
Netherlands	38.1	Korea (Rep.)	91.0
Switzerland	37.9		
Denmark	37.7	Sweden	84.0
Korea (Rep.)	35.7	Australia	82.7
Norway	35.3	Finland	78.1
Iceland	34.1	Hong Kong, China	74.5
France	33.9	Portugal	72.5
Luxembourg	33.2	Luxembourg	72.1
Sweden	31.8	Singapore	69.7
Germany	31.7	Austria	67.4
United Kingdom	31.6	New Zealand	66.2
Belgium	31.5	Kuwait	36.5
Hong Kong, China	29.9	Israel	63.5
Canada	29.8	Brunei Darussalam	61.4
Finland	28.6	Cyprus	61.3
United States	27.6	Italy	59.4
Malta	27.5	United Arab Emirates	58.4
Japan	26.9	Greece	58.3
Estonia	25.1	Saudi Arabia	57.8
Singapore	24.9	Macao, China	56.1
New Zealand	24.9	United Kingdom	56.0
Slovenia	24.2	Spain	55.7
Australia	24.2	Denmark	54.7
Macao, China	24.2	United States	54.0
Austria	23.9	Ireland	47.3

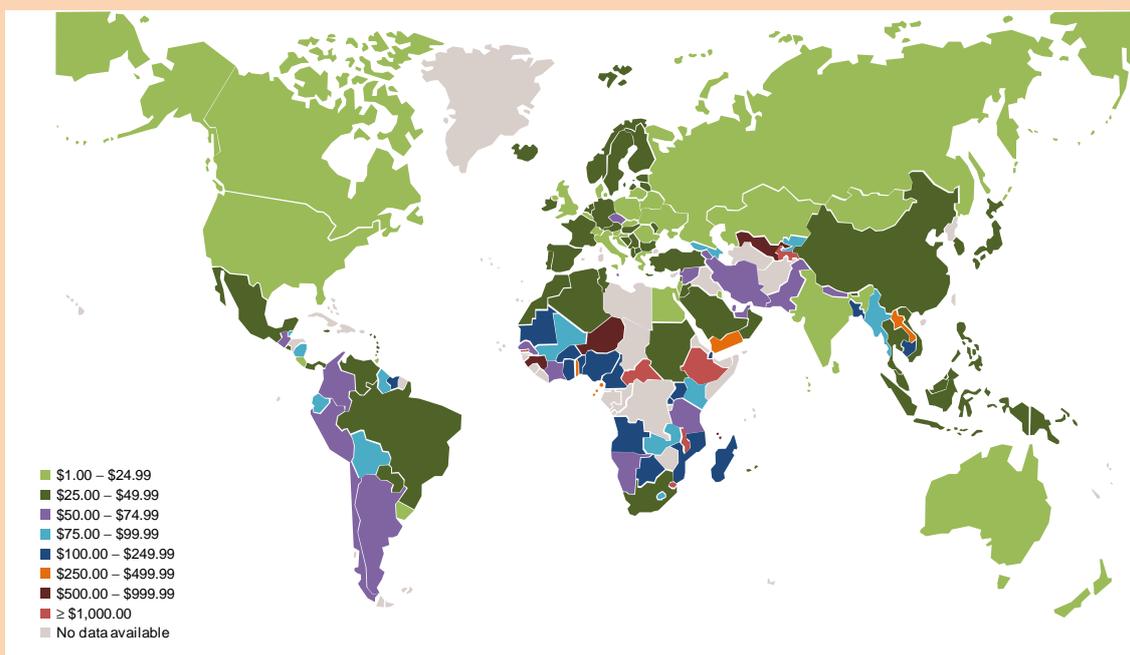
Notes: 1) Excludes economies with populations below 100'000;

2) * Data provided by Wireless Intelligence

Source: ITU World Telecommunication/ICT Indicators database, www.itu.int/icteye

One of the key determinants of affordability, adoption and usage is pricing. Pricing at both retail and wholesale levels can also influence the broadband investment and product decisions of network operators and service providers. Although in most developed economies competition in broadband markets has generally led to lower prices, Figure 3 shows that in much of the developing world the monthly subscription price for an entry-level residential broadband service of about 256 kbit/s still exceeds USD 50, accounting for purchasing power. The countries that have the most to gain from greater access to and adoption of broadband are thus often the ones where it is the least affordable.

Figure 3: Monthly subscription in PPP\$ (purchasing power parity in USD) for entry-level 256 kbit/s residential fixed broadband service (2009)



Source: ITU World Telecommunications/ICT Indicators Database, www.itu.int/icteye

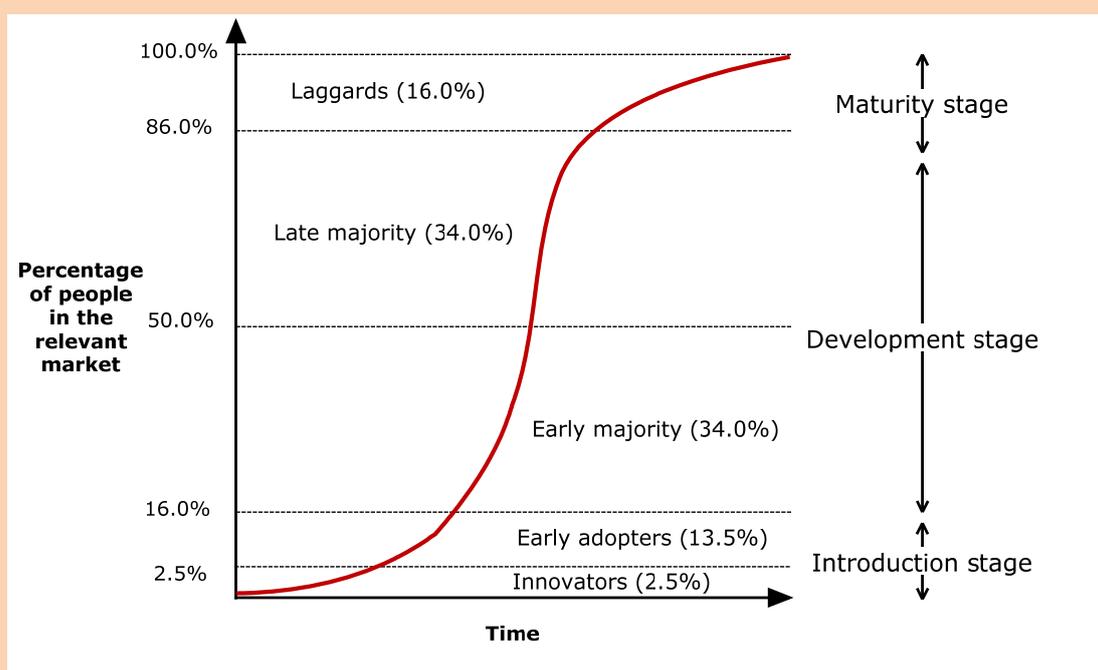
Broadband pricing is thus a tempting focus for regulation and many policy-makers and regulators come under pressure to act to ensure that broadband is universally affordable and accessible. However, it is important that any regulator contemplating some form of price regulation first considers the nature of broadband markets and where its particular market is in terms of its evolution and maturity. To do otherwise would risk distorting or delaying the long-term development of that market.

The broadband diffusion curves

The diffusion of broadband, like any innovation, tends to follow an s-shaped curve (Figure 4).² Adoption is slow initially but soon accelerates before stabilising as it reaches maturity. Diffusion curves will always tend to reflect a sigmoid function and are s-shaped. However, the particular shape of the curve—that is, its slope and the points of inflection, will differ between countries as a result of differences in such things as income per capita, the availability and penetration of substitute and complementary products, and the diffusion of precursor innovations and products.

² Rogers, E.M. (2003) *Diffusion of innovations*, 5th edition, New York, the Free Press

Figure 4: The diffusion curve



Source: Adapted from Rogers, E.M. (2003). *Diffusion of innovations*

The s-curve reflects the three stages in the evolution of a market: introduction, development and maturity. The introduction stage is prior to the first inflection; the development stage is between the first and second inflections; and the maturity stage is after the second inflection. In the context of broadband markets, in the introduction stage suppliers are focused on investment and network builds. The customers acquired during this stage are regarded as innovators and early adaptors. They will tend to be business rather than residential users, but this will ultimately depend on where the network is rolled out initially. In the development stage, adoption accelerates as the service becomes a mass market product and suppliers determine how to achieve sustainable profits. A critical mass of customers is achieved during this stage, which is the point after which further diffusion becomes self-sustaining.³ In the maturity stage, the rate of adoption slows and eventually starts to decline. An access gap may remain or become apparent and require incentives or subsidies from government.

The challenges faced by suppliers are different in each of the three stages, which lead to different pricing behaviour and outcomes. For example, during the introduction stage retail prices might be set high to recover development costs. Alternatively, retail prices might be set lower during the development stage in an effort to drive penetration and gain market share, in response to increased competition, or as economies of scale start to be realised. For similar reasons the role of policy-makers and the interventions of regulators must also be different during the different stages in the development of broadband markets. For example, in the introduction stage of a market when the services in question are new and immature, there is an increasing tendency towards regulatory forbearance to minimise the risk of distorting investment incentives and the development of the market.

³ Ibid.

This is reflected in the European Union's recommendation on markets susceptible to ex ante regulation:

Newly emerging markets should not be subject to inappropriate obligations, even if there is a first mover advantage... Newly emerging markets are considered to comprise products or services, where, due to their novelty, it is very difficult to predict demand conditions or market entry and supply conditions, and consequently difficult to assess whether the market warrants ex ante regulation]. The purpose of not subjecting newly emerging markets to inappropriate obligations is to promote innovation...⁴

In contrast, ex ante regulation tends to be more appropriate and often necessary during the latter part of the development stage of the market as, by this time, the market structure will have become clearer, making it possible to assess the barriers to entry and the factors that affect demand and supply. In the maturity stage the focus of the regulator should be on identifying and addressing the access gap.

Adopting a regulatory mindset or applying a regulatory measure that does not take account of the position of a national broadband market on the diffusion curve risks distorting investment and the long term development of that market. This risk is greatest when the regulatory intervention is intended to influence pricing, because the manner and timing of market development will likely be highly responsive to pricing.

Maturity in broadband markets is complicated by other considerations

Broadband is not a uniform product or concept and bandwidth capabilities and expectations are not static. With attention in many countries shifting to next Generation Access (NGA), it is becoming necessary to distinguish between the current generation of broadband and the "next generation". This is often done by describing the latter as high-speed or superfast broadband or next generation broadband. This is the practice that has been adopted in this study, with 'broadband service' being used to describe first generation bandwidth services of between 256 kbit/s and 24 Mbps (in one or both directions), and 'next generation broadband service' describing bandwidth services of 25 Mbps or more (irrespective of the platform used for delivery). The term 'broadband market' is used to refer collectively to both variants of broadband and the various services they enable.

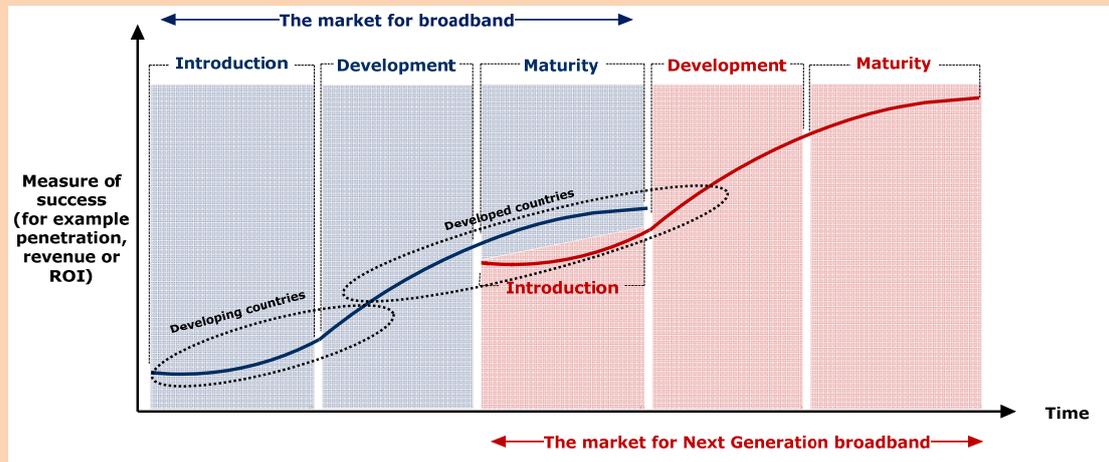
Next generation broadband is a relatively recent innovation in most economies and occupies a separate-and subsequent-diffusion curve to the first generation of broadband services. This idea is illustrated in Figure 5. Once again, the particular form of this combination of s-curves would differ across different countries. For some countries the diffusion curve for next generation broadband might begin while the original broadband market is in its maturity stage; in other countries it might begin during the development stage. In some countries the slope of the curve for next generation broadband services may be flatter than that for the first generation of broadband; in other countries the reverse may be true.

Overlaid onto Figure 5 is an approximation of where the broadband markets in developing and developed countries would generally exist today. All countries have some way to go before their broadband markets reach maturity. In developing countries it is apparent from the penetration rates shown in Figure 1 that maturity is still a long way away. In developed countries, the notion that broadband markets are not yet mature may seem counterintuitive given the high rates of penetration and its extensive usage. However, from a commercial perspective, which may use other measures of success such as revenue earned or the return on investment achieved to date, there remains considerable growth potential in broadband markets. It would be premature to describe broadband markets as mature until that potential has been realised and exploited. Further, as next generation broadband services are still in the early stages of development, it is inappropriate to describe broadband markets generally as mature as if that were a final

⁴ European Commission, Commission Recommendation of 17 December 2007 on relevant product and service markets within the electronic communications sector susceptible to ex ante regulation in accordance with Directive 2002/21/EC of the European Parliament and of the Council on a common regulatory framework for electronic communications networks and services, (2007/879/EC), recital 7

stage of market development. This is reflected in the general uncertainties about the strength of the business case for investment in next generation broadband, particularly about the level of demand for high-capacity services. It is also reflected in the different and still emerging policy directions of national governments regarding the extent to which investment in broadband markets will be encouraged, supported, shared or shaped.

Figure 5: The combination of diffusion curves across two generations of broadband



Source: Adapted from Rogers, E.M. (2003), *Diffusion of Innovations*

The regulatory understanding of broadband markets and the dynamics associated with broadband pricing are even less final. To date, regulators and policy makers have tended to view broadband markets and broadband pricing through the prism of the policy and regulatory frameworks that were applied to the legacy services of the pre-broadband (i.e. narrowband) era. Those policy and regulatory frameworks worked relatively well because they were voice-centric and customers knew precisely what the service was (it was a voice telephony service and, at least initially, nothing more). The service delivery value chain was simple and integrated and investments were substantially sunk with only some incremental investment required for annual expansion and replacement. Customer demand and expectations were generally well understood. Regulators and service providers alike had substantial relevant experience to guide them in their regulatory and commercial decision-making.

However, those norms do not hold for broadband markets (refer Table 1). Broadband environments are not voice-centric and are instead designed to sustain ubiquitous digital services, of which a voice telephony service is only one. As a consequence customer demand and expectations in relation to the new and converged services enabled by broadband are only partly understood. New investments are required and need to be encouraged or supported with public monies and the service delivery value chain is unbundled, potentially complex and still emerging. Regulators and service providers have limited experience in this context, particularly in relation to price setting.

In broadband markets suppliers will seek to develop their services and price packages in an experimental way, testing the market response and changing their offers accordingly. They will be encouraged by their circumstances, which may include different forms and degrees of competition, to be innovative and to offer differentiated price and service packages. In short, broadband suppliers will wish to behave in ways that do not conform to the regulatory norms for pricing in a mature market environment.

Table 1: Comparison of characteristics of narrowband, broadband and next generation broadband markets and services

Characteristic	Narrowband	Broadband	Next Generation Broadband
Demand	Well known and now declining in many developed economies	Known in developed economies and emerging in developing economies	Emerging in most economies – cultural patterns in evidence as well
Service innovation	Mature market and innovation has been applied to broadband	Some innovation, but innovation that is bandwidth-based is taking place in Next Gen Broadband	High speed applications are being developed especially involving moving images.
Diffusion	Development Phase in developing economies. Maturity phase in developed economies. The subject of most universal service schemes	Introduction Phase in developing economies. Development and Mature Phase in developed economies.	Most economies are in the Introduction and Development Phases.
Investment	Largely sunk, but some significant new investment for coverage in developing economies	Significant and on-going, but is being linked now with the requirements for next generation broadband.	Potentially huge for NGA and significant for NGN. In most economies the investment remains significant and on-going.
Regulatory Pricing Imperative	<ol style="list-style-type: none"> 1. Maximise competitive market pricing 2. Monitor migration 3. Lifeline pricing 4. Affordability pricing 5. Price caps 6. Ex post regulation for anti-competitive practices 	<ol style="list-style-type: none"> 1. Maximise competitive market pricing 2. Entry level pricing with price caps 3. Regulate for access to wholesale level services and facilities subject to not distorting incentives for next generation broadband investment 4. Monitor market 5. Ex post regulation for anti-competitive practices 	<ol style="list-style-type: none"> 1. Maximise competitive market pricing 2. Monitoring and forbearance 3. Promote commercial access to wholesale level services and facilities 4. Ex post regulation for anti-competitive practices

Source: Authors.

As difficult as it may be, to avoid distorting the development of broadband markets regulators will need to refrain from forcing onto broadband markets the regulatory pricing practices that were designed in and for a narrowband environment. Instead, it is necessary to adopt a new regulatory paradigm that emphasises monitoring and forbearance during the introductory and early development stages of broadband markets. Cautious regulatory intervention in response to evidence of market failure would be appropriate during the later development stages bearing in mind that those stages will be shaped around next generation broadband.

3 The regulation of prices

Price regulation is an important tool of ex ante competition policy

Price regulation in any market is most commonly used as a tool of competition policy. This is because, in the absence of price regulation, service providers with significant market power may increase prices beyond the levels they would otherwise be if the market was competitive, or set prices that are anti-competitive leading to many problems for consumers and competitors. Examples of possible anti-

competitive pricing practices include price discrimination, excessive pricing, predatory pricing, margin squeezes and price fixing. However, to add to the complexity of the issue, not all price discrimination or below-cost pricing is necessarily anti-competitive and may actually have pro-competitive effects in some circumstances.

In economies that are open to competition and have general competition laws, the administration of competition policy across the economy is typically the responsibility of a general competition regulator. In some cases, such as is presently the case in Australia and Fiji, that general competition regulator administers both economy-wide competition legislation and also legislation that is specific to telecommunications/ICT markets leaving the ICT sector regulator with no responsibility for price regulation. However, it is more common for the ICT sector regulator to have some responsibility for the administration of competition policy in telecommunications/ICT markets. This may be instead of the general competition regulator. For example, this is the situation across much of Africa, where general competition laws often do not exist. However, in most developed countries, together with a handful of developing countries, the telecommunications/ICT sector regulator will have concurrent jurisdiction with the general competition regulator, with the former responsible for ex ante regulation and the latter for ex post regulation.

Box 1: The difference between ex ante and ex post regulation

Ex ante regulation is anticipatory intervention that uses government-specified controls to:

- prevent socially undesirable actions or outcomes in markets; or
- direct market activity towards socially desirable ends.

Ex ante regulation is mainly concerned with market structure; that is the number of firms and level of market concentration, entry conditions, and the degree of product differentiation.

Ex post regulation addresses specific allegations of anti-competitive behaviour or market abuse and aims to redress proven misconduct through a range of enforcement options including fines, injunctions, or bans. Ex post regulation is mainly concerned with market conduct – the behaviour of a firm with respect to both its competitors and its customers.

Source: ITU-infoDev ICT Regulation Toolkit, www.ictregulationtoolkit.org

A reliance on ex post competition laws alone is only realistic where there is effective competition in a market. This may not be the case in broadband markets, particularly broadband access markets where the potential to price services above competitive levels or in a way that is anti-competitive may be a consequence of the inherent structure of the market and not simply the behaviour or attitude of the firms that operate within it. Although anti-competitive behaviour can be punished after the fact (ex post), which may act as a deterrent, the behaviour can still cause considerable harm before it is officially found to constitute illegal behaviour, punished and discontinued. Irreversible damage to competition may occur in the meantime. An example is shown in Box 2. Accordingly additional ex ante protections are necessary to facilitate competition and counter the risk of harm that arises from undue market power.

Box 2: An example of the application of ex post competition laws to broadband pricing

In July 2003, the European Commission fined Wanadoo Interactive, a subsidiary of France Télécom, EUR 10.35 million for predatory pricing of its ADSL-based retail broadband service. The Commission found that between 1999 and 2002, Wanadoo intentionally set its retail prices below cost and managed to increase from 46 per cent to 72 per cent its share of a market that increased in size by 500 per cent over the same period.

The Commission was of the view that the extent of the losses that would have been incurred by Wanadoo's competitors if they tried to compete with Wanadoo at the prices it set in the market deterred potential competitors from entering the market at a key stage in its development.

Source: European Commission, High-speed Internet: the Commission imposes a fine on Wanadoo for abuse of a dominant position, IP/03/1025

Whether or not ex ante regulation of competition may be warranted in a particular market is typically identified by applying the so-called 'three criteria test' of the susceptibility of a market to ex ante intervention. The application of this test has been documented by the European Commission⁵ and by the Body of European Regulators for Electronic Communications (BEREC).⁶ The test has since been adopted widely and is applied in many countries outside of Europe, such as Moldova, Oman and Saudi Arabia. Under this approach a particular market will be considered susceptible to ex ante regulation if:

- 1) it has high and continuing barriers to entry;
- 2) is not tending towards a sustainable competitive market; and
- 3) ex post regulatory controls are unlikely to be sufficient to address concerns associated with market dominance.

However, even if a particular market fulfils all three criteria, it does not automatically mean that ex ante regulation is necessary in that market. The regulator may still forbear to examine the way the market develops, particularly if there are other constraints that might discourage exercise of market power.

A minimalist approach to regulation will help avoid market distortions

A competitive market is much better at setting prices than regulation. As explained in a 2006 report by the Canadian Telecommunications Policy Review Panel:

There are a number of reasons why competitive telecommunications markets can serve consumers and the general economy better than regulation or other government intervention. One key reason is that setting prices and conditions of service that benefit both service providers and customers requires large amounts of information, more than a single organization can easily gather, keep up-to-date and use. This is true whether the organization is government or private sector. In competitive markets, changes to prices and conditions of services are generally made by trial and

⁵ European Commission, *Recommendation on relevant product and service markets within the electronic communications sector susceptible to ex ante regulation in accordance with Directive 2002/21/EC of the European Parliament and of the Council on a common regulatory framework for electronic communications and service*, OJ L344/25 of 28 December 2007. See also the *Explanatory Note – Accompanying document to the Commission Recommendation on relevant product and service markets within the electronic communications sector susceptible to ex ante regulation in accordance with Directive 2002/21/EC of the European Parliament and of the Council on a common regulatory framework for electronic communications and services*, SEC (2007) 1483 final.

⁶ European Regulators Group (June 2008), *Report on guidance on the application of the three criteria test*, Available at www.erg.eu.int/doc/publications/erg_08_21_erg_rep_3crit_test_final_080604.pdf

error, taking into account what has worked in the market and what has not. Competitive market forces can process more information and do so more efficiently than any single service.⁷

Box 3: The European Commission's three criteria test of whether a market is susceptible to ex ante regulation

'In order to identify markets that are susceptible to ex ante regulation, it is appropriate to apply the following cumulative criteria. The first criterion is the presence of high and non-transitory barriers to entry. These may be of a structural, legal or regulatory nature. However, given the dynamic character and functioning of electronic communications markets, possibilities to overcome barriers to entry within the relevant time horizon should also be taken into consideration when carrying out a prospective analysis to identify the relevant markets for possible ex ante regulation.

Therefore the second criterion admits only those markets whose structure does not tend towards effective competition within the relevant time horizon. The application of this criterion involves examining the state of competition behind the barriers to entry.

The third criterion is that application of competition law alone would not adequately address the market failure(s) concerned.

The main indicators to be considered when assessing the first and second criteria are similar to those examined as part of a forward-looking market analysis, in particular, indicators of barriers to entry in the absence of regulation, (including the extent of sunk costs), market structure, market performance and market dynamics, including indicators such as market shares and trends, market prices and trends, and the extent and coverage of competing networks or infrastructures. Any market which satisfies the three criteria in the absence of ex ante regulation is susceptible to ex ante regulation.

Source: European Commission (2007), Commission Recommendation of 17 December 2007 on relevant product and service markets within the electronic communications sector susceptible to ex ante regulation in accordance with Directive 2002/21/EC of the European Parliament and of the Council on a common regulatory framework for electronic communications networks and services

However, in the absence of or uncertainty about the effectiveness of competition in a market, it will often be necessary for the regulator to intervene to mimic the pricing outcomes that would be expected in a competitive market until competitive market forces strengthen. However, regulators must be cautious about intervening too early or too heavy-handedly, particular in markets that are characterised by new and innovative services and where the level of demand is not yet clear. This is to avoid distorting the development of that market, which could discourage the investment necessary to develop services in response to latent demand.

This is reflected in the European Commission's guidance to European regulators that:

... emerging markets, where de facto the market leader is likely to have a substantial market share, should not be subject to inappropriate ex-ante regulation. This is because premature imposition of ex-ante regulation may unduly influence the competitive conditions taking shape within a new and emerging market. At the same time, foreclosure of such emerging markets by the leading undertaking should be prevented. ...NRAs should ensure that they can fully justify any form of early, ex-ante intervention in an emerging market, in particular since they retain the ability to intervene at a later stage...⁸

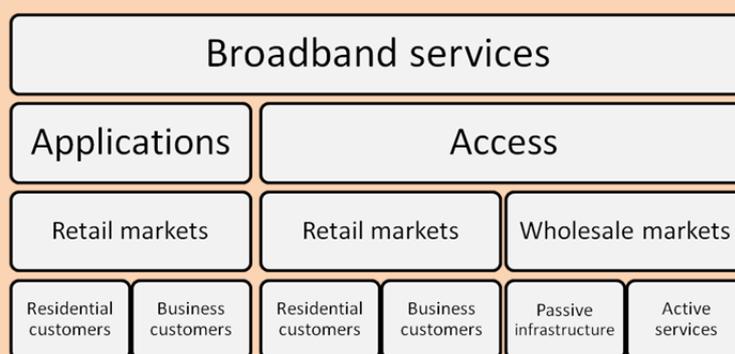
⁷ www.telecomreview.ca page 3–5

⁸ Article 32 *Commission guidelines on market analysis and the assessment of significant market power under the Community regulatory framework for electronic communications networks and services*, (2002/C 165/03)

In many developing economies, where broadband services may only have been introduced very recently and issues of affordability, customer equipment and IT literacy create a low level of demand, broadband markets may qualify as an emerging market. In developed countries, where broadband markets may be more mature, next generation broadband markets can be considered to be emerging markets.

It is thus important that regulators adopt minimalist approaches to ex ante price regulation that leaves maximum room for competition to develop and reduces the risk of regulatory intervention distorting the demand for, or development of, broadband services. This means that regulators should identify particular points in the broadband supply chain where market dominance may be exercised over pricing and address those areas with the least level of regulation that will also be effective. To do this, regulators need to conceptualise broadband markets in terms of *wholesale* and *retail* and adopt different approaches to the regulation of prices in each. They must also conceptualise broadband services in terms of *access* and *applications* (often referred to generally as *services*), and consider each carefully. This idea is illustrated in Figure 7.

Figure 7: A conceptualisation of broadband services and markets



Source: Authors

Many wholesale and retail markets can exist along the broadband supply chain

The broadband supply chain describes the combination of facilities and processes that are involved in the delivery of a broadband service to an end-user.⁹ At the top of the chain is the international connectivity that provides the link to the rest of the world. It is typically supplied by means of terrestrial and submarine cables or satellite or some combination thereof. The second link in the supply chain is the national backbone networks that carry traffic between the landing points for the international connectivity and other points within the country. These backbone networks will typically consist of fibre-optic cables, microwave links and satellite links. The third link is the “intelligence” contained in the networks that ensures data is routed correctly. The fourth link is the access network, which may be xDSL over a copper local loop, some form of cable or various types of wireless (including mobile) technologies. The final link in the supply chain is the various retail activities*such as sales and marketing, tariffing and billing and customer care, through which service providers serve customers. This supply chain is illustrated in Figure 8.

⁹ The following discussion of the broadband supply chain is adapted from Williams, M.D., *Broadband for Africa: Developing backbone communications networks*, available at www.infodev.org/en/Publication.526.html

Figure 8: The generic broadband supply chain

Source: Adapted from Williams, M.D. (2008), *Broadband for Africa: Developing backbone communications networks*

There are two key types of broadband markets that regulators must consider: that of a service provided to end-users (an applications market) and that of access to facilities (such as physical network and information) necessary to provide such services (an access market).¹⁰ It is possible to identify both types of market in each stage of the broadband supply chain. Within these two broad market definitions further market distinctions may be made depending on demand and supply side patterns. In access markets distinctions are typically made between the provision of infrastructure to other operators (a wholesale service) and its provision to end-users (a retail service). At the retail level, both applications and access markets may be further segmented based on different categories of consumers, namely residential customers and business customers.

Regulation in wholesale markets minimises the need to regulate retail markets

Generally speaking the regulator should be concerned to ensure that wholesale markets for access to facilities or applications operate to ensure that downstream retail broadband access and applications service markets are competitive. As the type of ineffective competition or market dominance that leads to excessive prices in retail markets is often the result of ineffective competition and market dominance in an upstream wholesale market, regulators should seek to regulate as far upstream in the supply chain as practicable given the nature of the competition problem they are trying to correct. The rationale for this approach is explained further in Box 4. It is considered to represent the least intrusive form of regulation as it does not directly seek to control the pricing or sales approaches of a service provider in a retail market. This approach is also a highly effective use of a regulator's limited resources as it can, if correctly targeted, help address price-related competition problems along the entire supply chain (that is, a case of high effort: effectiveness ratio, while leaving open maximum scope for the emergence of competitive service alternatives).

A regulatory focus on wholesale markets also minimises the risk of discouraging new firms from entering the market. Firms enter markets where profit opportunities can be identified-this is typically the case at the beginning of liberalisation where an incumbent statutory monopolist may be seen to be extracting excessive profits. If opportunities for profit at the retail level are minimised by the imposition of retail price regulation-i.e. potential profits are regulated away, then it is unlikely that firms would seek to enter those markets and the potential for competition and overall welfare gain might be lost.

¹⁰ See European Commission, Notice on the application of the competition rules to access agreements in the telecommunications sector (OJ C 265, 22.8.199), paragraph 45, available at <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:c:1998:265:0002:0028:en:PDF>

Box 4: Ofcom on its preference for regulation at the wholesale level

'In a competitive market, the pricing of services on the basis of the commercial judgements of individual companies could be expected to deliver cost-reflective pricing. However, where competition cannot be expected to provide effective pricing constraints, ex ante regulation is desirable to prevent excessive pricing. Such intervention should also have as its objective the aim of moving the market towards a position where effective competition is realised. Where the competition problem arises at an upstream stage in the production chain, it is likely to be appropriate to regulate the pricing of wholesale inputs, in order to allow effective competition to develop in downstream markets, rather than control downstream prices themselves. In markets where competition is not effective, dominant providers are likely to set excessive prices, in order to maximise their profits and, where the dominant provider is vertically integrated, to increase the costs of competing providers. Higher wholesale charges are likely to mean higher retail prices which would be detrimental to consumers.'

Source: Ofcom UK, Review of the wholesale local access market, paragraphs 5.59–5.60

Price regulation at the wholesale level may not always completely remove the need for some form of ex ante price regulation at the retail level, particularly during the period of transition following market liberalisation. However, as wholesale regulation will have flow on effects in the downstream retail markets, it is important to focus on correcting pricing problems at the wholesale level before considering whether the downstream retail markets still require any ex ante regulation of their own. Only if wholesale market remedies are inadequate or unlikely to produce competitive outcomes in the short to medium term should retail regulation be contemplated. This was the conclusion reached by the Telecommunications Regulatory Commission in Jordan following its analysis of fixed broadband markets in 2010 (Box 5)

Box 5: TRC Jordan on wholesale regulation

'...the [Telecommunications Regulatory Commission (TRC)] has found that, in principle, the retail market for fixed broadband Internet access should not be susceptible to ex ante regulation, given that the regulation of relevant wholesale markets...is likely to address the specific competition problems initially identified. The TRC notes that the wholesale access remedies...encompass obligations that shall prevent the Dominant Operator from leveraging its dominance into the retail market for fixed broadband Internet access. The TRC, however, also notes that it would revisit the conclusion that the retail market for fixed broadband Internet access is not susceptible to ex ante regulation if the wholesale remedies imposed by virtue of this Decision are not effectively implemented by the dominant Licensee(s).'

Source: Telecommunications Regulatory Commission of Jordan, Regulatory Decision on Fixed Broadband Markets Review, 15 July 2010

4 Regulating wholesale prices

Wholesale price regulation must avoid undue distortion of commercial decisions

If a wholesale broadband market passes the three criteria test, and an analysis of the market shows there to be a dominant service provider in that market, the regulator will need to determine at what level it will focus its regulatory intervention. The regulator may require the dominant operator to provide access to certain network infrastructure as a means of enabling market entry and increasing competition. This may be necessary if other (potential) service providers rely on that infrastructure for delivery of their own services and there is—as a result of market dominance—a significant difference in the ability of the

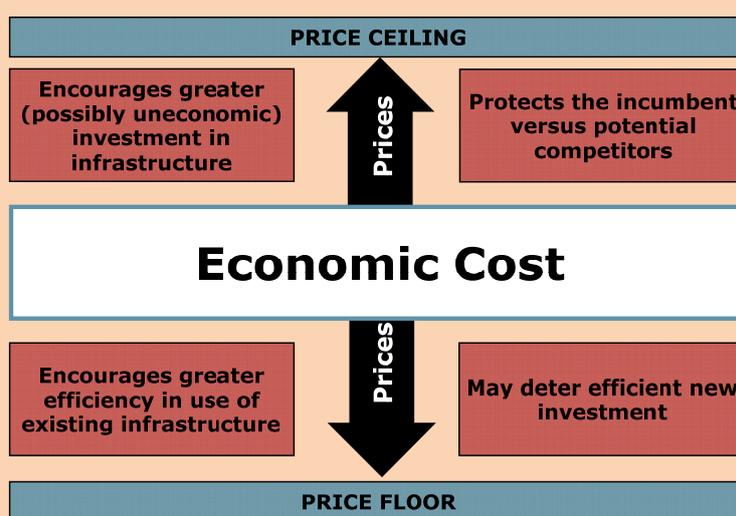
operators to negotiate such access on commercial terms and conditions. In doing so the regulator must balance the rights of an infrastructure owner to exploit its infrastructure for its own benefit, and the rights of other service providers to access facilities that are essential for the provision of competing services.

The infrastructure to be shared may be either passive or active. Passive infrastructure includes all the civil engineering and non-electronic elements of infrastructure, such as physical sites, towers, ducts, unlit (that is, dark) fibre, and electricity supplies. Active infrastructure refers to the electronic elements of infrastructure, such as lit fibre, access node switches, and broadband remote access servers and access node switches and management systems for fibre networks. A regulator may require a dominant operator to provide access to either passive or active infrastructure, or to both.

The particular options available to the regulator, and its decision, will tend to vary depending on which stage in the broadband supply chain the regulator is focused and the particular market being examined. For example, in the wholesale broadband access markets in most of the European Union countries, the regulators have mandated access to the (passive) unbundled local loop. In Tanzania, the Tanzania Communications Regulatory Authority (TCRA) required the Tanzania Telecommunications Company (TTCL) to provide equal and ubiquitous access to fully operational, active broadband capacity services on its national backbone infrastructure. In Singapore, the Infocomm Development Authority (IDA) required SingTel to provide (passive) collocation at its submarine cable landing station and certain (active) connection services between any collocated equipment and SingTel’s submarine cable distribution frame.

From the perspective of regulatory pricing, if both passive and active access options are made available to a new entrant it is important that the regulator’s pricing of the options available in each category do not unduly distort the access seeker’s “buy versus build” decisions. As demonstrated in Figure 9, if the regulated price for active infrastructure is above the economic cost of building that infrastructure, then competitive entry in the form of the construction of additional infrastructure may be inappropriately encouraged. However, if the regulated price is below the economic cost, then this may provide insufficient encouragement of the construction of new infrastructure and promote over-reliance on the existing infrastructure of the dominant operator.

Figure 9: Regulatory pricing based on economic costs



Source: Authors

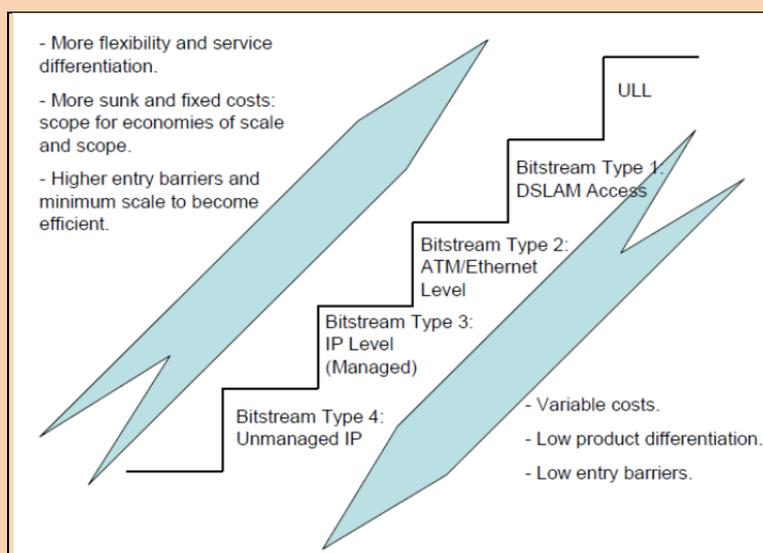
This concept is a particularly important consideration when regulating the prices of different types of wholesale products within a single segment of the broadband value chain. This issue is most prominent in the access network segment of the broadband supply chain where regulators often require dominant

operators to supply various types of passive and active wholesale access products at different prices. In such circumstances both the absolute wholesale price and the relative wholesale price (that is, relative to the prices of the other wholesale access services) are important. An overview of the collective view of European regulators on this particular aspect is provided in Box 6 in the context of the “ladder of investment” approach to wholesale access regulation.

Box 6: Wholesale price signals and the ladder of investment

The “ladder of investment” approach is applied in broadband markets by regulators in the majority of European Union countries. Under this approach, new entrants into a broadband market initially occupy the lowest “rung” of the ladder, by reselling the vertically integrated incumbent’s services (i.e. service-based competition). After that, the entrant climbs up the ladder by investing in infrastructure and deploying a network to offer services progressively closer to the end user.

The diagram below shows how access to less integrated wholesale (i.e. towards unbundled local loop (ULL)) services requires higher investments and could imply higher sunk costs. For example, ULL requires that some infrastructure is deployed by the alternative operator to reach the local exchanges of the incumbent (e.g. DSLAM, backhaul, IP Network). This requires higher investment and sunk costs but can lead to decreased variable costs. On the other hand, wholesale bitstream access (WBA) implies higher wholesale costs but requires lower investment.



Alternative operators take prices as signals which give incentives either to climb up the ladder of investment (when prices of the wholesale service are high compared with an equivalent self-supplied upstream service) or remain in the same step (when it is cheaper to use the wholesale service rather than invest in additional elements of the network). Given this trade-off, regulators should try to ensure consistent prices between different wholesale access products so that once an alternative operator has reached a given size, it is worthwhile for it to move the next rung in the ladder of investment. Moreover, the prices set for the lower rungs of the ladder should be designed to give incentives to alternative operators to climb up the ladder even before they have reached that size. Thus there should be sufficient “economic space” created between WBA and LLU prices to avoid hindering competitors’ investments in LLU and alternative infrastructure.

However, regulators must also take care not to create too much economic space between different wholesale products as this can provide incentives for inefficient entry and inefficient duplication of infrastructure.

Source: Adapted from The Body of European Regulators for Electronic Communications (June 2009), ERG Report on price consistency in upstream broadband markets, Report no. (09) 21

Wholesale price regulation must differ for passive and active infrastructure

Regulated prices for wholesale access are typically determined after taking account of risk; that is where the cost of capital employed is adjusted for the country, market, enterprise and other risks associated with the investment. This enables the wholesale customer to gain access to the economies of scale that have been achieved by the wholesale provider as a consequence of its dominance in the relevant market, but adjusted in terms of the investment risks. Whether all risks are adequately reflected in the risk-adjusted cost of capital is not explored in this study as it is an issue that raises a major and more general set of issues not specific to broadband access.

When selecting which cost standard it will adopt in its regulation of wholesale prices, the regulator needs to be clear about its policy objective. For example, does the regulator wish to allow new entrants to remain dependent on leased facilities from an incumbent or does the regulator prefer that new entrants establish their own separate network infrastructures once they have traction in the market. The regulator's policy objectives may change depending on which stage in the broadband supply chain the regulator is focused on, and the type of infrastructure involved. See for example the comments by the European Commission in Box 7 in relation to wholesale pricing of access to passive infrastructure.

Box 7: The European Commission on the use of different cost standards for different types of passive infrastructure

'In determining the cost base used for cost-orientation obligations...NRAs should consider whether duplication of the relevant NGA access infrastructure is economically feasible and efficient. Where this is not the case, the overriding aim is to create a genuine level playing field between the downstream arm of the SMP operator and alternative network operators. A consistent regulatory approach may therefore imply that NRAs use different cost bases for the calculation of cost-oriented prices for replicable and non-replicable assets, or at least adjust the parameters underpinning their cost methodologies in the latter case.'

Source: European Commission (2010) Section 1 of Annex 1 to Commission Recommendation of 20.9.2010 on regulated access to Next Generation Access Networks (NGA)

The choice of cost standard will be one of the factors that will promote (or impede) the desired outcome as certain standards are better suited to particular circumstances than others. If the wholesale service is a complete service that a vertical integrated operator supplies to its own downstream operations, then the cost standard should be augmented by principles of access equivalence (or no less favourable treatment) vis-à-vis that downstream operator. If the service is typified by a degree of scarcity-such as access to towers or ducts which can physically support only so many users, then the cost standard needs to be related to a share of the replacement value of the facility based on the proportion of system capacity that is used by the access seeker.

In assessing which cost standard is most appropriate in particular circumstances, the regulator should consider the likely consequences for economic efficiency of adopting that standard in the circumstances. Three relevant measures of economic efficiency are allocative efficiency, productive efficiency, and dynamic efficiency. In pricing terms, allocative efficiency requires that prices should reflect costs and any common costs are recovered in a way that minimises distortion of consumption choices. Productive efficiency requires production costs to be minimised relative to units of output. Dynamic efficiency requires that appropriate incentives to invest in new technologies and deploy new services should exist (refer Figure 9 above). The selection of a cost standard will necessitate a trade-off between these different types of efficiency as it is unlikely that any one method could maximise all forms of efficiency.

Cost-based access pricing for passive infrastructure

The pricing principles for access to passive broadband infrastructure do not need to be different from the principles and approach most regulators tend to adopt in a narrowband context. In both cases, the use of an incremental cost standard such as the long run incremental cost (LRIC) that includes an appropriate mark up for common costs would further economic efficiency. Those common costs relate to the ordering and provisioning of access to civil engineering infrastructure or fibre, operating and maintenance costs for IT systems, and operating costs associated with wholesale product management. The wholesale prices set through regulation should not be higher than the cost that would be incurred by an efficient operator, so a regulator should ideally evaluate costs using a bottom up model.

Indeed, in its recommendation on access to next generation broadband access networks, the European Commission advises regulators to ‘regulate access prices to civil engineering infrastructure consistently with the methodology used for pricing access to the unbundled local copper loop’, which was LRIC.¹¹

Box 8: An overview of incremental costs

The **economic cost** of an activity is the **forward-looking** cost of performing that activity in the most efficient way possible, taking into account the technological and other constraints that exist. The costs are not theoretical or unachievable. Forward-looking costs are those associated with present and future uses of available resources. It is these costs that are relevant for making production and investment decisions and for setting prices for the services to be provided now or in the future.

Incremental costs are the forward-looking **economic** costs incurred to produce an additional quantity or increment of output. The calculation of incremental costs requires comparison with a baseline scenario without the costs of an additional service or output. The change in output might be marginal (say a single unit of output) or a total service.

Types of incremental costs

Different time horizons for cost studies lead to three important cost types. The first is **long run incremental cost (LRIC)** and includes all the directly assignable variable economic costs of a specific increment of service. From a public interest perspective – i.e., an efficient economic outcome where society’s scarce resources are allocated to their highest-valued purpose – the price of every unit demanded should equal or exceed its marginal cost (MC). Otherwise, if price were set below MC, a customer would consume units of service whose cost to supply exceeded the value of what the consumer gave up to consume the unit of service. Such consumption would be wasteful, and the consumer would be induced to consume too much of the service.

The second relevant cost measure is **total service long run incremental cost (TSLRIC)**, which includes all directly assignable variable and fixed economic costs of a service. Total service incremental cost is a special case of incremental cost, where the increment of output in question is the total volume of a service. That is, total service incremental cost for a new service measures the increase in costs causally associated with the supply of the new service at the full volume of its likely demand.

The third relevant cost measure is **total element long run incremental cost (TELRIC)**, which was introduced by the Federal Communication Commission in the U.S. in 1996. TELRIC is viewed as a special case of TSLRIC, where costs are calculated for network elements, rather than retail services.

Economists refer to TSLRIC/TELRIC and LRIC as incremental costs respectively expressed on an *average* or *per unit* of service basis.

¹¹ EC (2010) Annex 1, section 2

Total service incremental cost differs from ordinary incremental cost in two respects:

- a. The per-unit total service incremental cost measures an average incremental cost over the entire range of output of the service. This means that the average cost of adding a complete service to the suite of services produced is calculated rather than the cost of a unit of that service; and
- b. Total service incremental cost includes service-specific fixed costs, because, although these costs might not vary with the level of the incremental service output, they may be saved or avoided if the whole service were to be discontinued.

The issues that must arise if prices of new services, such as broadband services, are to be subjected to regulation relate to the justification and the purpose of the regulation.

As we have shown, ex ante regulation (including price controls of any kind) are typically justified in the absence of competition, and seek to address the risks of harm from dominance in such markets. Where a market has a dominant operator but is also characterised by substantially sunk investment and maturity in the patterns of demand, the intervention of the regulator may have little extraneous risk to other important social and economic goals. This may well be the case in many economies for fixed narrowband networks. These networks are typically mature in terms of the technologies and infrastructure deployed and the level of historical investment that has been undertaken. Although there is always some risk of reduced investment and maintenance resulting from the price control regimes imposed on such networks, the risk is regarded as less than in the case of broadband network investment which, in many countries, is yet to be fully committed.

Cost standards such as TSLRIC that have been applied to narrowband access or to call termination services, which emphasise efficiency standards that the operator may not have been able to achieve, and which rely on forecasts of future equipment and labour cost levels that may not eventuate, may be insufficient to appropriately incentivize the investments needed by broadband infrastructure and platform providers. We have in mind here the monopolistic or near-monopolistic provision of basic conveyance platforms upon which service providers and applications will be provided competitively by all authorised providers, but where the major investment is yet to be committed. A typical case would be where a fibre to the home network is contemplated and is being rolled out.

In these situations the regulator has a clear justification for imposing ex ante price regulation of some kind to ensure that the broadband infrastructure provider (wholesaler) seeks to extend its network capability to the fullest extent rather than to sub-optimize at some higher point in the demand curve. The approach that a regulator will take may well be dependent on whether the wholesale broadband services provider is a vertically integrated operator with retail businesses, or whether it is purely wholesale.

In many regulatory regimes the determination of the terms and conditions for wholesale access and interconnection is based on the negotiate/arbitrate model. Under that model, the access provider and the access seeker must attempt to negotiate an outcome on a commercial basis. If negotiation fails, then one or both parties may take the matter to the regulator for arbitration of the matters that remain in dispute. It works well for the setting of terms and conditions – such as the technical arrangements for interconnection – on which the parties are likely to find an agreement and where there is little potential for a win/lose commercial outcome. However, this seldom extends to negotiations between competitors in a retail market in relation to the price of a mandatory wholesale access product where a higher price received by one party means a higher price must be paid by the other party. International experience thus suggests that the regulator is likely to be called upon to arbitrate on matters of prices, particularly if the dominant party has an incentive to delay the mandated access and market entry. In such circumstances, regulators can improve the probability of a negotiated outcome by publishing its pricing principles or similar guidelines that signal to the negotiating parties the rules that will be applied to achieve an arbitrated outcome.

Source: Compiled by authors.

In a scenario where the facilities owner is vertically integrated and a competitor in a downstream market for retail broadband services, the supply of the regulated wholesale service may be regarded as

incremental to its retail service businesses. In this case, the facilities owner would add to its profits if it supplied the regulated wholesale access at any price that was above the incremental cost of doing so. This was the rationale behind the European Commission's recommendation on the use of 'pure LRIC' for the determination of narrowband call termination rates.¹²

However, there is an important caveat to such an assumption in the context of broadband. To achieve termination in a narrowband call termination market, the non-dominant operator must obtain a wholesale terminating service from the dominant operator. It is not possible for the non-dominant operator to build alternative facilities to terminate a call to a customer of the dominant operator. However, in a broadband market, it is possible for a non-dominant operator to build or use alternative facilities.

New cables to access customers' premises can be installed overhead, drawn through existing ducts, or in some cases leased from municipal authorities or utility providers.

New ducts may be installed-albeit at a significant cost-or may be obtained from municipal authorities or utility providers. Although the capital costs associated with such installations is substantial and disproportionate to the immediate needs of the new entrant, some of those costs can be defrayed by selling excess capacity onto third parties.

There is risk that an incremental pricing approach will encourage new entrants to utilise existing facilities at the expense of investment in new facilities in areas where replication of those facilities is feasible. As shown earlier in Figure 9, this depends on where the (regulated) wholesale price of access is set having regard to the build/buy decision of the access seeker and the approach to risk. New entrants may have a minimum build commitment that will yield capacity well in excess of their current needs. Consequently they may place greater value on allowing the risk to be disproportionately shared by the incumbent and seek to lease capacity or access at regulated prices. Regulators can mitigate this risk by placing some form of sunset provision on various aspects of the mandated access. For example, the regulator could deregulate the price terms after a period, or deregulate the access altogether after a period, or require (as KPN must do in the Netherlands) the access provider to provide appropriate notice of the withdrawal of the service in any particular location.

Regulators must also be careful to ensure that any regulated wholesale prices realistically reflect the risk accepted by the facilities owner in deploying the facilities, particularly if the facilities exist in areas of limited existing or potential demand for broadband. To this end, the regulator should take into account the possibilities that demand may be at the lower end of a given range and determine the unit price of regulated access accordingly or alternatively require a minimum purchase from any access seeker.

A modified approach should be considered in circumstances where the facilities owner is a pure infrastructure provider that has no licensed or legislated ability to provide services above Layer 2 in the Open System for Interconnection (OSI) model¹³ (refer Figure 10). A LRIC standard typically includes a mark-up to allow for the recovery of a portion of common network costs. However, a facilities owner that provides only wholesale services would have no retail or other customers from whom to recover its common costs. A pure LRIC standard would be inappropriate in such circumstances if it would not allow for the full recovery of the facilities owner's common costs. Accordingly, the adoption of a fully allocated cost standard might be more appropriate in these circumstances. The regulator would have the additional comfort that the wholesaler would be a willing participant in the wholesale market and would not price on the basis of giving advantage to any associated downstream retail business. This is the situation

¹² European Commission, (2009) *Commission Recommendation of 7.5.2009 on the regulatory treatment of fixed and mobile termination rates in the EU*, available at http://ec.europa.eu/governance/impact/ia_carried_out/docs/ia_2009/c_2009_3359_en.pdf

¹³ ITU-T Recommendation X.200, *Information technology – Open Systems Interconnection – Basic Reference Model: The basic model*, available at www.itu.int/rec/T-REC-X/en

currently faced in Australia where the government has established a new network operator called NBN Co. to build and operate a national fibre-to-the-home broadband network on a purely wholesale basis¹⁴.

Box 9: The European Commission on investment risk in fibre-based broadband networks

Investment risk should be rewarded by means of a risk premium incorporated in the cost of capital. The return on capital allowed ex ante for investment into NGA networks should strike a balance between on the one hand providing adequate incentives for undertakings to invest (implying a sufficiently high rate of return) and promoting allocative efficiency, sustainable competition and maximum consumer benefits on the other (implying a rate of return that is not excessive)...NRAs should estimate investment risk inter alia by taking into account the following factors of uncertainty:

- (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) macro-economic uncertainty.

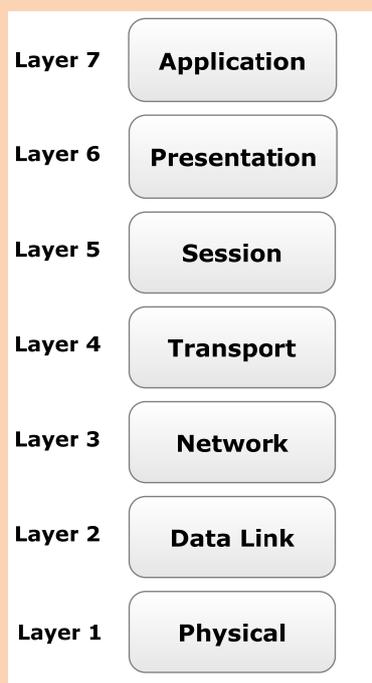
These factors may change over time, in particular due to the progressive increase of retail and wholesale demand met. NRAs should therefore review the situation at regular intervals and adjust the risk premium over time...

The above considerations apply in particular to investment into FTTH. Investment into FTTN, on the other hand, which is a partial upgrade of an existing access network (such as for example VDSL), normally has a significantly lower risk profile than investment into FTTH, at least in densely populated areas. In particular, there is less uncertainty involved about the demand for bandwidth to be delivered via FTTN/VDSL, and overall capital requirements are lower. Therefore, while regulated prices for WBA based on FTTN/VDSL should take account of any investment risk involved, such risk should not be presumed to be of a similar magnitude as the risk attaching to FTTH based wholesale access products.

EC advises that when setting a price for civil engineering infrastructure the regulator should not adopt a different risk profile from that of the copper infrastructure or in the case of FTTN to copper sub-loops, except where the incumbent had to incur specific engineering costs beyond normal maintenance to deploy an NGA network. When setting prices for access to terminating fibre in FTTH, it may need to reflect a higher risk premium to reflect any additional and quantifiable risk incurred by the operator in the deployment of FTTH.

Source: Adapted from European Commission (2010), Commission recommendation of 20 September 2010 on regulated access to Next Generation Access Networks (NGA), (2010/572/EU)

¹⁴ In this example from Australia (and similar to other countries such as Singapore and New Zealand) a new entity has been created with a limited remit. Nothing has been separated per se, but the new entity is separate from the existing operators. This approach seeks to address the same types of problems that functional or structural separation does, by through design ex ante rather than regulated separation ex post.

Figure 10: The Open System for Interconnection (OSI) model

Source: ITU Recommendation X.200

Access pricing for active infrastructure

The regulation of wholesale prices for active infrastructure is often complicated by the active nature of the services and because those services are typically central to the network operator's efforts to create value for their retail customers and differentiate themselves from their competitors. If the outcome is simple resale and the creation of an arbitrage opportunity through regulatory intervention, then one may well wonder how this promotes the expansion of broadband and the development of innovative and differentiated services. Further, there can be multiple variations on a single type of active service—for example, bitstream services of different bandwidth or capacity—necessitating the regulator to set different wholesale prices for each bandwidth. In such circumstances, if the wholesale prices are based on cost, then the arbitrage opportunities will expand significantly at higher capacities.

If wholesale prices are to be based on costs, the regulator has a choice of cost standard. As in the case of price regulation for access to passive infrastructure, that choice will be influenced by the nature of the particular market and the nature of the dominant network operator. For example, a FAC cost standard would be more appropriate than LRIC where the network operator is a pure wholesaler and not vertically integrated.

However, it can be very difficult to undertake detailed cost analyses or cost modelling of active services. Next generation broadband services are distinguished in terms of quality of service and bandwidth capacity. All services have similar frequencies for the use of network elements and therefore the routing tables that have traditionally been used to allocate the costs of discrete network elements across the range of services will be very much simplified. Another way of stating this is that there will be few network elements that are used by specific services in ways that are not directly proportionate to bandwidth. The directly allocated costs of service provision will thus be small and the mark-up for shared and common costs will be a much greater proportion of the total service cost than currently. The result will be greater scope for error in the results from standard bottom-up cost models.

Further, there is rarely any easy way to allocate shared and common cost between different active services. It is entirely reasonable for different people to have different opinions on the principles to use to

determine which costs are capacity-dependent (i.e. costs that are allocated proportionally based on changes in the capacity of a product), which are distance-dependent (allocated proportionally based on the distance over which traffic is routed), and which are service-dependent (allocated proportionally based on service volumes). The value associated with service capacity variations is not necessarily linear but a cost approach to capacity cannot adequately reflect that. Distance affects engineering costs—such as the costs for ducting or for fibre—but these costs may not be reflected at the service level. On a fibre ring the distance of all calls conveyed via the ring are effectively equal because calls may be conveyed in both directions to other services on the ring. IP based packet technologies offer infinite packet routes compared to the predictable routing and therefore cost allocations will not be route or distance specific in networks based on circuit switched technologies.

In the case on a vertically-integrated network operator, an alternative to calculating cost-based prices is to base the regulated price on the operator's retail prices, discounted by the value of its retail costs or those of a hypothetical efficient operator (Figure 11.) This approach, called 'retail minus avoided costs' or simply 'retail minus', does not attempt to control the absolute level of prices but the margin between wholesale and retail prices.¹⁵ The regulated operator is free to set its retail prices but the maximum wholesale price that it may charge is determined by the retail minus formula. It therefore does not require the regulator to form a view on either the appropriate level of wholesale prices or the value of the underlying costs. This may be desirable when a broadband market is immature and it is difficult to forecast accurately demand and the rates of adoption. At such a critical stage in the development of a market, retail minus pricing will also guard against margin squeeze (consider again the 2003 case involving France Télécom mentioned in Box 2).

Figure 11: An explanation of the retail-minus approach to pricing



Regulated pricing based on retail minus has the disadvantage that neither party has an incentive to reduce wholesale costs and pass on to end-users the associated savings in the form of lower retail prices or better service. For this reason the European Commission advises regulators in member countries to apply retail minus pricing only where there are sufficient competitive constraints on the downstream retail operations of the vertically integrated operator.¹⁶ It is also inappropriate or even impossible to apply retail minus pricing to a wholesale product that the regulated operator does not itself offer at the

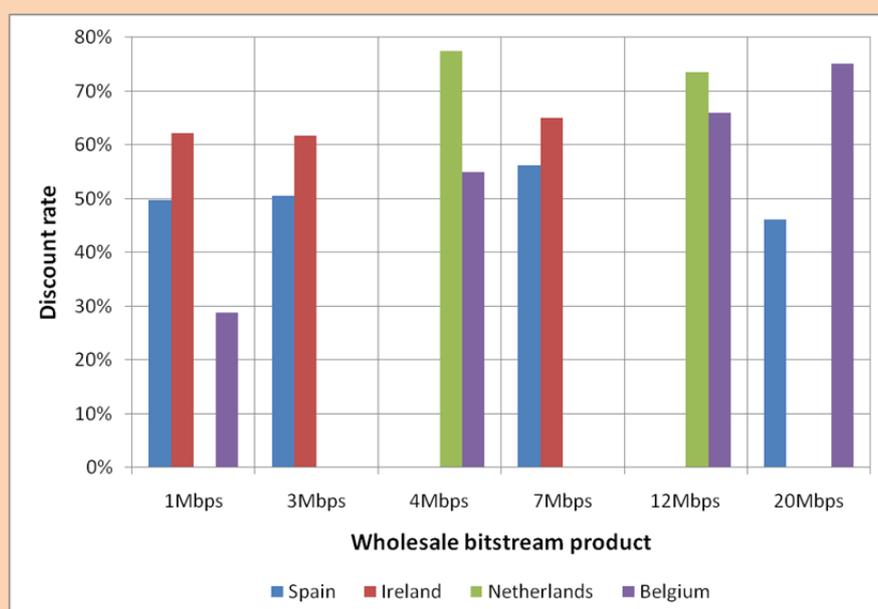
¹⁵ For further information on retail minus pricing, see *infoDev/ITU ICT Regulation Toolkit* at www.ictregulationtoolkit.org/en/Section.3492.html

¹⁶ European Commission (2010) Section 1 of Annex 1 to *Commission Recommendation of 20.9.2010 on regulated access to Next Generation Access Networks (NGA)*, paragraph 37, available at <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2010:251:0035:0048:EN:PDF>

retail level. This could arise, for example, if the regulated operator was subject to an obligation to fulfil requests for bespoke wholesale products even if it does not have a need for the particular wholesale input itself. (In such circumstances, the retail costs would need to be imputed from the other retail operations of the wholesaler or alternatively from proxies based on the competing retailers.)

The regulator will need to undertake a substantial cost analysis to determine a discount rate that appropriately reflects the avoidable retail costs (i.e. the “minus”, efficient component pricing rule ECPR, etc.). Although this would be less onerous than the development of a cost model, the regulator will need to take care to determine a discount rate that is neither modest nor excessive. If the discount is too small, retailers will have insufficient margin to compete effectively against the vertically integrated operator’s retail operations. If the discount is too great, there will be little incentive for retailers to invest in building alternative infrastructure and inefficient operators may be encouraged to enter the market. The regulator could set a discount rate based on international benchmarking however, as illustrated in Figure 12, there can be considerable variation in the retail costs of different operators in different countries. It is something that will be heavily influenced by the particular circumstances of the operator and the market.

Figure 12: Comparison of the discount rates used in retail minus pricing of various wholesale bitstream products (2011)



Source: Authors based on regulators’ websites

The complexities involved in the establishment of wholesale prices for access to active services means that price-setting in this area can be a particularly problematic exercise for regulators. There are major difficulties in determining discount rates that optimally balance competition and investment incentives. As well there is a risk that cost-based discount factors for avoidable costs will leave substantial arbitrage opportunities for the reseller.

Regulators would be well advised to avoid attempting to set prices for active services and instead focus on regulating behaviour. However, the appropriateness of such an approach would depend on such factors as the nature of the competition problems identified in the regulator’s analysis of the market; the relevant stage in the broadband supply chain; the maturity of and level of competition in the relevant broadband market; and the resources and alternatives available to the regulator. A practicable alternative to ex ante price-setting would be the ex ante application of margin squeeze tests prior to the launch of retail broadband products by the vertically integrated operator. That is, the vertically integrated operator

should be able to undertake the margin squeeze tests itself, if guidance from the regulator is clear enough.

5 Regulating retail prices

Addressing market dominance issues in the upstream wholesale markets is the best way regulators can facilitate competitive price levels in retail broadband access and service markets. However, it is possible that such action may not be sufficient. Inter-modal competition between fixed and mobile broadband networks may not be a sufficient constraint on pricing in all segments of a retail broadband market. The introduction of retail competition through regulation of wholesale markets may also take some time to establish.

In such circumstances some form of ex ante regulation of retail prices may be appropriate or even necessary. This need not take the form of price setting (i.e. of regulatory setting of individual prices). Such intervention is rarely appropriate and risks long term damage to the development of broadband markets as it does not recognise the opportunities for earlier service take-up by more users that exist with careful price differentiation. A practical alternative is to focus retail price regulation on a standardised entry-level broadband product that ensures broadband is universally affordable and leaves the rest of the retail market subject to market forces (supported, where appropriate, by wholesale price regulation). Such an approach is likely to become more common as universal service policies increasingly include broadband services¹⁷ and will aid the eventual transition to the next generation of broadband.

The problems of retail price regulation

Regulators face a dilemma if they contemplate regulating the level of retail prices in an uncompetitive broadband market. Firms enter markets where profit opportunities can be identified. New competitors will therefore be dissuaded from entering the market if they perceive their potential retail profits being diminished by the regulator.

Further, as the regulator may easily under-estimate the risks borne by the pioneering broadband infrastructure provider, and may be applying inappropriate tools derived from mature narrowband markets that have been subject to regulation over many years, the regulator is sharing economic welfare gains with service and applications providers and with end-users before those gains have materialised. The regulator's intervention will thus dampen competition, the absence of which was the reason for the regulator's intervention in the first place. The continuing lack of competition thus reinforces the perceived need for the regulator to interfere with retail prices, thereby perpetuating the problem and undermining the regulator's efforts to establish efficient price levels that might encourage investment and even competition.

The techniques for setting retail prices that are available to regulators are also problematic. The manner in which some regulators control retail price levels in narrowband markets – such as through rate of return regulation, price caps or international benchmarking – are inappropriate for broadband markets and cannot be transferred to the broadband environment for a range of reasons.

Rate of return regulation, whereby the regulator specifies the maximum allowable rate of return that may be earned from the supply of a product, is inappropriate because it implicitly requires an understanding of the risks associated with the undertaking and the returns that are commensurate with such risks elsewhere in the economy (or at least in the sector). The risks associated with broadband investments are not known. Broadband markets are still developing and have not reached a final stage of maturity for the reasons already explained, and the demand levels and patterns that will emerge for very high speed applications are largely in the future for most economies. A regulator that sets a rate of return for

¹⁷ According to a 2011 ITU survey, 40 per cent of the 192 member countries that responded stated that they currently include broadband in respective USO/US policies.

broadband services runs substantial risk of severely distorting the development of the market and investment levels, which will tend to cohere around the level set. The regulator would thus be guessing and gambling on an unknown future.

Price caps regulation requires some view of rate of return to be set in the first instance and then to be re-set. Price cap regulation is inappropriate because, like rate of return regulation, it will involve a guess about the appropriate price ceilings and cost relationships between services that should or will apply in future. Price caps work best as incentive regulation where services are grouped in single or multiple service ‘baskets’ that is subjected to a price driver that is related to prospective levels of efficiency relative to the price levels that apply generally in the economy. Price drivers for broadband will be even more fanciful than those for legacy services, and the starting point may well be an issue as well. If retail broadband services are highly priced (relative to other economies or to costs) then the price driver (or deflator) should be higher than if the starting point was low retail broadband prices. Whether the starting point is low or high will depend on a view of service risk that regulators typically cannot reliably assess in the case of emerging or new services.

Setting retail broadband prices based on international benchmarks involves the obvious problems associated with the appropriateness of the prices in the benchmarked set compared to the economy in which the regulator is operating. The benchmark prices would be prices set by competitive markets or set by regulators. If the former, there would need to be proof of effective competition in the broadband market in comparable circumstances to the home country. If the latter, the foreign regulators are unlikely to have demonstrably more or better experience at retail broadband pricing than the home regulator. There may be comfort in this form of benchmark but it may be false comfort. Benchmarking is not easy at the best of times, and the difficulties equally present where the retail services are broadband.

There are other forms of retail price regulation besides the setting of specific price levels. These generally involve the regulator being notified of, and/or approving a service provider’s retail prices. There are two distinct forms of such pricing oversight with two very different purposes. The first is where the regulator is concerned about the potential for a vertically integrated operator that is dominant in a wholesale broadband market to impose a margin squeeze on its competitors in a retail market. The second is where the regulator second guesses the pricing decisions of service providers and assumes an active role in setting actual retail prices. The former can be an important supplement to price regulation in a wholesale market. The latter is problematic and out-dated, and usually is not well-based in economic terms.

Retail price regulation as a wholesale market remedy

Some regulators assume a role in the notional approval of retail broadband prices to ensure that a vertically integrated service provider that is dominant in a wholesale market does not leverage its market power into the competitive downstream retail market. The regulator is only interested in retail prices for the purpose of testing for a margin squeeze (refer Box 10). The regulator’s involvement in the approval of retail prices is thus limited and is focused on ensuring that the proposed retail prices are not anti-competitive given the price of relevant wholesale inputs. Such obligations are typically introduced as part of a remedy in a wholesale market and not for the purpose of keeping retail prices at a particular level.

By way of example, in Italy Telecom Italia must notify the regulator of any new or amended broadband prices 30 days before Telecom Italia introduces them. This is to allow the regulator to test for a potential margin squeeze to ensure that the proposed tariffs provide sufficient margin to enable Telecom Italia’s competitors to replicate and compete with Telecom’s retail service given the price of Telecom’s wholesale inputs. The regulator imposed this obligation because Telecom Italia is vertically integrated and was found to have SMP in the wholesale broadband services market, which creates potential for Telecom Italia to squeeze the margins of those of its competitor that rely on wholesale services supplied by Telecom. Similarity in Spain Telefónica must notify the regulator of new retail broadband prices 15 days before they are introduced to enable the regulator to test for margin squeeze and anti-competitive product bundling practices.

Box 10: Explanation of margin squeeze and its test

To be able to implement a vertical margin squeeze (also called a price squeeze), a firm must be vertically integrated, and control an essential wholesale input to the retail service. A firm implementing a price squeeze offers to supply this essential input to its retail competitors only at a price greatly in excess of its costs.

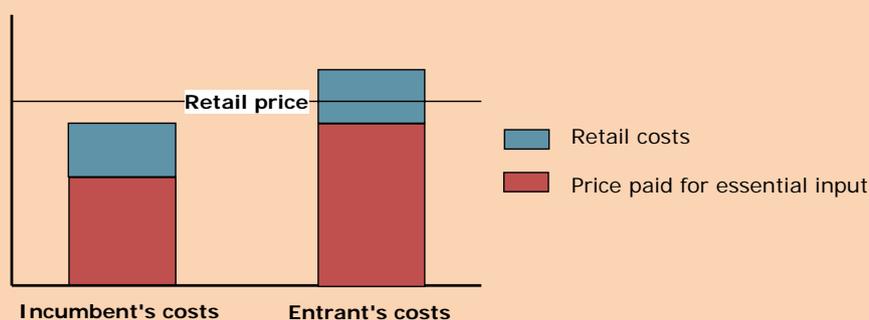
The key elements of a margin squeeze are:

- The firm demands a price for the essential facility that is so high that it is not possible 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.

In the extreme, the firm might demand a price for the essential input that is higher than the full retail price of the service.

A margin squeeze can only succeed if the essential input has no effective substitutes. If such substitutes are available, the margin squeeze will simply encourage entrants to use the substitute to produce competing retail services.

A margin squeeze has a similar effect to a refusal to supply an essential facility. By charging a high price for the essential input, a vertically integrated firm can reduce the effectiveness of its competitors, or in the extreme force them out of the market. In the figure below, an incumbent firm owns an essential input, on which an entrant depends in order to provide service to its customers. Both firms have the same costs at the retail stage of the market. The incumbent obtains the essential input at incremental cost, but charges the entrant a price substantially greater than incremental cost. As a result, the entrant's total costs exceed the retail price for the service, and it is forced to exit the market.



In 1998, the European Commission proposed two imputation tests to establish whether a price squeeze exists. The first test (called an Equally Efficient Operator test, EEO) involves assessing whether the dominant/SMP firm's downstream operations could trade profitably if it had to pay an upstream price that was equivalent to that charged to rival competitors. The second test (called a Reasonably Efficient Operator test, REO) involves examining whether the difference between the vertically integrated firm's retail and input prices is sufficient for a "reasonably efficient" downstream competitor to make a "normal" profit. The primary difference between the two tests is that the first is based on the relationship between the vertically integrated company's retail price and its own (non-regulated) cost, while the latter is based on the relationship between the vertically integrated company's prices and the alternative operator's costs. Although the European Commission mainly refers to the first imputation test, regulators in the European Union have adopted either test according to their needs to test for the occurrence of a margin squeeze.

Source: ITU-infoDev ICT Regulation Toolkit, Module 2/European Regulatory Group (2009), Report on the Discussion on the application of margin squeeze tests to bundles, (ERG (09) 07), www.ictregulationtoolkit.org

Retail price setting by regulators

Some regulators may require broadband service providers to submit their retail broadband prices to the regulator for its approval or variation. Such an obligation may be tied to a perception or determination of market dominance (such as in the case of Israel) or it may simply apply to all service providers (as in Namibia). Either way, regulatory price setting is a very inflexible measure for a very complex area. It assumes that the regulator is better informed and sufficiently resourced to second-guess the pricing decisions of a commercial operator and the price expectations of customers across the range of segments associated with retail broadband services.

To approve retail prices ultimately requires the regulator to form a view as to what is an “appropriate” price for a particular product, which runs into the same problems noted above regarding the legacy regulatory techniques for setting retail prices. As noted earlier, setting prices in a competitive market involves a significant degree of trial and error by operators and is always unfinished business, and market forces are better able to process all the relevant supply and demand factors in a particular market than any single organisation or individual.

Regulatory intervention in the setting of retail broadband prices is generally inappropriate in a market that is open to competition. During market liberalisation, the regulation of retail broadband prices is typically and appropriately replaced with economic analysis and a focus on fixing problems in wholesale markets first. This transition is currently occurring in Bermuda, for example (Refer Box 11).

Box 11: Reform of the retail price regulation framework in Bermuda

At present, under the *Telecommunications Act 1996* the Bermuda Telecommunications Company (BTC) must submit its proposed retail prices for broadband services to the Telecommunications Commission prior to introducing a new telecommunications service or varying the tariffs for an existing service. The burden of proof is on BTC to show that its proposed tariffs are ‘just and reasonable’. The Telecommunications Commission will publish the proposed tariffs and invite ‘objections’ from the public. The Telecommunications Commission then has 30 days in which to make a decision to approve, vary or disallow the proposed tariffs.

Bermuda is in the process of reforming its telecommunications sector. The *Telecommunications Act 1996*, together with the existing price approval framework, is intended to be repealed by new legislation to be called the Electronic Communications Act. Among other things, that new legislation will require that any ex ante price regulation be based on the findings of a formal market review process.

The Minister responsible for implementing the reforms explained the proposed changes in 2008 thus:

‘It is proposed that retail price regulation for telecommunications should be changed, so that the [Regulatory Authority] has the power to determine the degree of necessary price regulation...This proposal is likely to decrease the regulatory burden on licensees and enable all licensees to compete in the market without undue regulatory interference. The proposed regulatory structure should also mean that the [Regulatory Authority] would only investigate prices where it has cause to believe that anticompetitive effects may result or consumers will be harmed. This reduces overall regulatory costs and allows the competitive dynamics to cause price reductions for the benefit of consumer.’

Source: Ministry of Energy (2008), Telecommunications and E-Commerce, Telecommunications Regulatory Reform Policy

The small number of countries with liberalised broadband markets that require regulatory approval of retail broadband prices typically do so under a statutory price regulation framework and not as the result of a market analysis process. This generally reflects an inability of policy-makers and regulators to “let go”

and minimise their market interventions. For example, in Israel the Ministry of Communications (which is the regulator) requires the incumbent fixed network operator, Bezeq, to submit all retail broadband prices to the Ministry for its approval 45 days prior to the proposed introduction of those prices. This is despite a broadband penetration rate of 84 per cent of households and effective inter-modal competition between the fixed telecommunications network and a cable television network (and increasingly mobile network operators). This price regulation derives from Committee established by the Knesset¹⁸ and is not the outcome of a market analysis process or the identification of specific competition problems.

Retail regulation is best limited to a single entry-level product

If some form of retail price regulation is considered necessary to protect the interests of more vulnerable consumers, it should be of limited scope and avoid distorting the development of the market. An innovative way to achieve this difficult task is to apply retail price controls only to entry-level broadband services and leave all other retail prices unregulated and determined by market forces. The regulated product might be a basic broadband lower capacity service that a dominant service provider is obliged to offer at a specific price, or it could be a standardised product that all broadband service providers are obliged to offer as a minimum. This novel approach has the virtue of ensuring that an acceptable minimum broadband service is made available at an affordable price, thereby stimulating greater adoption. It also has the virtue of being a building block in the construction of a universal broadband service policy. At the same time it encourages competition among the higher speed services to which most consumers will upgrade after entering the market. In this way, policy objectives relating to broadband affordability and adoption can be met with minimal distortion to competition and to the development of the retail market.

This type of approach is likely to become more prevalent as universal service policies are expanded to include broadband internet access and as more broadband networks are built using public funds. In Finland, the 26 telecommunications operators that are subject to a universal service obligation must be able to provide every permanent residence and business office with access to a 'reasonably priced' broadband internet connection of at least 1 Mbit/s (downstream). The 'reasonable price' is not defined in regulation but the USO operators and the Communications Ministry agreed that a reasonable price would be a monthly fee of between EUR 30 and EUR 40.¹⁹ This agreement avoided the introduction of a retail price cap, which the Communications Ministry had threatened to impose. The resulting flexibility allowed for price variation where costs differed between operators in different parts of the country. In Ireland, under the government's National Broadband Scheme,²⁰ a mobile network operator was awarded a government contract to supply a broadband product of 1.6 Mbps (downstream) for EUR 19.99 per month in specified parts of the country where the government considered broadband availability to be insufficient.

¹⁸ Hayek Committee, *The Report of the Committee for Promotion of Competition in the Telecommunications Industry in Israel*, Executive Summary, March 2008 at p.11 (www.moc.gov.il/139-en/MOC.aspx)

¹⁹ Finish Communications Regulatory Authority (2010); *Reasonable pricing of 1 Mbps universal service broadband*, available at www.ficora.fi/en/index/viestintavirasto/uutiset/2010/P_26.html

²⁰ For further information, see www.dcenr.gov.ie/Communications/Communications+Development/National+Broadband+Scheme.htm

6 The consequences of broadband pricing during periods of technological transition

As telecommunications generally shifts from narrowband platforms to broadband platforms, the continuation of legacy regulation of voice telephony pricing will be increasingly problematic and irrelevant. Regulators will need to consider how – and when – to recognise voice over broadband as a substitute for traditional fixed telephony services, and will need to rethink the traditional approaches to the regulation of retail telephony prices. Such issues will become particularly acute – and may influence the effectiveness of customer migration – once next generation broadband access networks start to be deployed en masse to replace the existing copper-based circuit-switched (fixed) networks.

Broadband and the continued regulation of retail telephony prices

In many countries, fixed broadband service providers are bundling broadband with IP-based telephony services. These telephony packages are often quite innovative and adopt pricing structures that are very different from that of the traditional plain old telephone service (POTS) offered by the incumbent PSTN operator. These VoIP packages often mimic the pricing structure of mobile telephony by including free call elements and “all-you-can-eat” price plans. Sometimes voice telephony is even given away for free provided the overall spend is above a nominated monthly minimum. As a consequence, such broadband telephony will increasingly provide an effective competitive constraint on the pricing of narrowband fixed voice calls. Over time this will allow regulators to withdraw or modify retail price regulation of fixed voice telephony.

Regulators have generally been reluctant to relax retail price controls over fixed telephony services because of the continuing social importance attributed to subsidised voice access. This is despite an increasingly greater proportion of voice calls being originated on mobile networks, a trend that is most pronounced in developing countries where fixed networks have not been materially extended beyond major urban centres. This regulatory inertia can often be ascribed to a reluctance of regulators to “let go” and an aversion to the risk that retail fixed call prices might increase appreciably in the absence of price controls, particularly in high cost service locations outside urban areas.

There are of course other competitive pressures on the pricing of fixed telephony. Key amongst those – especially in developing economies – is the expansion of mobile services, in many cases to areas that are not served by fixed network operators. However, even in countries where formal market analyses have been undertaken, regulators have not tended to withdraw retail price controls from fixed telephony. Typically fixed telephony and mobile telephony will be regarded as two separate markets. A recent case in point is in Saudi Arabia where the regulator concluded that:

Mobile services have characteristics that are quite different from fixed services. They are a means of personal communication, and each service is generally used by a single subscriber. This aspect is enhanced by the mobility that the service offers as its defining characteristic. In contrast, fixed services are location-specific and found in family residential or business office settings. The costs of service are also different, together with the price plan options, price levels and structures.²¹

This approach is similar to that of many other regulators that continue to apply ex ante retail price controls to fixed telephony. It is an approach which is under threat as mobile call services become more obviously substituted for fixed call services across a range of business and personal situations. The Austrian regulator, the RTR, determined that fixed and mobile voice were essentially one market in 2010. Other regulators are bound to follow, but for now the Saudi Arabian approach remains standard.

Perhaps even more apparent will be the increasing difficulty for regulators to differentiate narrowband telephony markets from broadband telephony markets. The characteristics of fixed telephony from the

²¹ CITC *Market Definition, Designation and Dominance Report*, p. 4 (2010), www.citc.gov.sa

user's perspective are the same whether supplied over narrowband or over broadband infrastructure, and substitution – the factor determining market boundaries – will be based on price. At that point regulators will need to decide whether to price voice services in the data-centric environment of broadband or persist in giving it special treatment based on historical approaches to regulation.

Regulators will need to reshape their retail price controls on fixed telephony services (if these controls are to be retained at all) as fixed broadband networks come to replace fixed narrowband network. In that environment voice will be a low bandwidth and low cost application amongst many others. The premium on voice pricing relative to its cost in a broadband environment may need to be lowered via glidepath regulation to avoid short term disruption. (A glidepath is a means of achieving a pre-determined outcome through a series of incremental changes over a specified period.) In the medium term voice calling will be lower priced and may even be a free (or near-free) offering to attract customers to other higher-priced broadband applications.

Broadband and the (limited) future of retail price cap regulation

In many countries – especially developing countries with limited competition – retail price controls on fixed telephony are set by ministerial or regulatory fiat. In liberalised markets, it is more common for a price ceiling to be imposed on a basket of services that includes fixed telephony and access (refer Box 12). However, neither approach is optimum during the period of transition to an all-broadband environment. Administratively-determined pricing tends to prop up the status quo and prevents more appropriate cost and demand signals from re-shaping voice services and forcing the changes in business models needed to adapt to a broadband environment. Although incentive regulation such as price caps are better, they tend to reflect general economic cost metrics, such as consumer price indices, rather than the potential for telephony prices to decline as a result of lower provisioning costs via broadband.

Box 12: Retail price cap regulation

Under price cap regulation, the regulator controls the prices charged by the firm, rather than the firm's earnings. This focus on prices (and not profits) is what provides for improved efficiency incentives. The regulator determines an annual price cap formula. This formula determines whether prices should change in each annual period, and by how much. The regulator usually specifies in advance the period that the formula will apply for. Under a typical price cap, the regulated firm is permitted to alter its average price for a basket of regulated services at the rate of the general level of inflation minus an efficiency factor based on the regulated firm's expected efficiency (the $-X$ -factor).

Some regulators also allow the firm to adjust for changes in costs beyond its control, by including an exogenous cost component in the price cap formula (the Z -factor).

An example of a price cap formula is set out below:

$$PCIt = PCIt-1 * [1 + CPI - X \pm Z]$$

In the above formula, $PCIt$ and $PCIt-1$ are the price cap index in the current year and the previous year, respectively. CPI is the Consumer Price Index (or an alternative index of inflation). X and Z are adjustments for expected efficiency gains and for exogenous costs, as discussed above

Price caps have a number of advantages over other forms of regulation that focus on the firm's realized earnings. The fact that the regulated firm is permitted to retain any realized earnings creates strong incentives to improve efficiency and reduce costs, beyond the level required by the X -factor. The infrequent reviews of the price cap formula reduce regulatory costs (by avoiding frequent rate cases), and encourage the firm to implement strategies to reduce costs in future periods, as well as in the current year. Finally, under price cap regulation, the regulated firm has much more flexibility in the prices that it can charge its customers as long as average prices do not exceed the cap

Source: *The World Bank, InfoDev, and the International Telecommunication Union (2011), Telecommunications Regulation Handbook*

If regulators had good information on future potential cost savings associated with broadband, they might consider developing forward-looking price caps that factor in progressive movement to broadband platforms. The price cap would then become an incentive for broadband investment and for appropriate business model adaptation. However, this approach is simply not available and never will be. Broadband platforms are characterised by a much higher proportion of common and shared costs that circuit-switched specific-service networks, and therefore rely far more on ascertaining the totality of services that will be provided over the network and then allocating costs based on selected-cost drivers (such as QoS or capacity) to each service.

In addition, regulators seeking to adjust voice service price caps for a broadband platform need to decide on the transition period that should underpin the glidepath. These are not administrative or regulatory matters alone, and depend on an aggregation of engineering, commercial, operational and demand considerations that regulators are not well-equipped to judge. Although the adjustment of retail price caps for the broadband future may sound worthwhile, and some regulators may claim to be doing it, it nonetheless raises all of the regulatory limitations and risks of market distortion that accompany inappropriate but well-meaning regulation of markets.

Pricing will influence customer migration to next generation broadband

Some of the value in having a single platform will have been stripped away if continued operation of other platforms is mandated or if price regulation based on legacy platform costs is retained. The difference in retail access charges between the continuing PSTN copper access and the newer fibre or hybrid fibre-copper access will also serve not only to reduce broadband network take-up but defer the mass enrolment that might lead to access prices that close the gap. On the other hand, if the copper network is progressively retired and the services on them migrated without customer consent or involvement to the new broadband fibre network(s), then prices will need to be similar for those end users who want a continuation of similar functionality. These end users will not be moved either at all or in the short to medium term by the possibilities of using new and innovative higher speed services.

Regulators may not need to specifically regulate for price continuity because broadband operators will recognise the commercial need to move to new platforms and retire old platforms as quickly as possible. This applies if the old and new platforms are being operated by the same network operator. A different outcome could result where the new broadband platform operator is different and not the PSTN incumbent. The latter case applies in Australia, but is on the way to settlement by the broadband operator, NBN Co, paying the PSTN incumbent, Telstra, to transfer its customers and to progressively retire its copper network. (See Box 13.)

Box 13: Extract from Australia's National Broadband Network Implementation Study

'Over time, the Implementation Study expects the fibre network to become a mass-market essential service. Wireless networks will continue to be important, but as bandwidth-hungry applications and content become more prevalent, they are expected to become complementary to fibre, rather than a substitute.

If NBN Co prices for affordability and take-up and given the expected deterioration in the quality and economics of copper, NBN Co's fibre network is likely to emerge over time as the predominant fixed-line access network. This will require careful planning for the transition of legacy services and obligations that are technology-dependent.

...

Government should expect strong take-up of NBN services in the long-term if NBN Co sets prices to enable retailers to offer superior value to end users currently served by the copper network. Driving take-up should be the main priority for NBN Co over the coming decade.

...

Wholesale prices for NBN services should be set to meet the goals of affordability and take-up. As a wholesale-only provider, NBN Co cannot set the retail prices that end users will ultimately pay. However, the wholesale price that NBN Co charges will be the largest input cost for a retailer. This price will therefore have a substantial influence on retail price levels.

...

NBN Co's immediate priority should be take-up of services, which will require wholesale pricing that provides retailers with a better business case on fibre than they currently enjoy on copper, for a significant portion of their customer base. Over time, it is likely end users will see additional value in high data rates as more bandwidth-hungry applications and content become common. New services such as IPTV and innovative applications will also emerge. However, the timing and nature of these future services are uncertain....

For some time, NBN Co will co-exist with legacy copper and HFC networks, either in competition, or during a transition period in which retailers are migrating their traffic onto the NBN.

NBN Co should set prices to deliver a superior offer to service providers compared with such legacy networks. Based on the Implementation Study's modelling, this implies pricing entry-level wholesale fibre services at between USD 30 and USD 40 per month – depending on the level of the competing copper ULL price – with uniform prices across the fibre access network.

Given the advantages that fibre has over copper in operating costs, set-up costs and expected churn, this will enable retailers to offer consumers much faster broadband speeds without increasing the prices they charge end users. Over time, end users will attribute greater value to fibre capabilities, particularly as rich services continue to become more prevalent. As this happens, NBN Co should be permitted to increase real prices gradually under [regulatory] supervision to earn a reasonable return on its assets over its lifetime – but must not be permitted to extract monopoly rents.'

Source: McKinsey and KPMG (2010), National Broadband Network Implementation Study

7 Conclusion

This study has emphasised the importance of regulatory forbearance when it comes to prices in broadband markets, for at least as long as those markets remain in a growth phase. However, it is also recognised that some form of price regulation may be necessary to address specific market failures identified through a market analysis process. Such intervention should be as far upstream in the broadband supply chain as practicable and ideally limited to wholesale prices only.

Alas, this does not provide an absolute answer to the questions that many regulators currently face: Should we regulate prices or not? And if so, how? The answers to such questions must be based on a detailed consideration of the specific circumstances of the relevant market and nation. There are no answers that are generally applicable. However, to assist regulators to answer these questions themselves, the thesis of this study has been summarised in seven principles of best practice. In addition, a step-by-step guide for regulators considering the need for broadband price regulation is provided below.

Best practice principles for the regulation of broadband pricing

In terms of regulation, the best practices are those that encourage early investment in broadband infrastructure and stimulate competition at the lowest layers of the OSI model (Figure 10). However, the colouration of best practice regulatory policies on pricing may tend to be country-market specific. Thus the application of these best practices will need to be shaped to accommodate local circumstances, such as retail affordability and demand parameters. With those caveats, best practice in the regulation of broadband pricing is encapsulated in the following seven principles. Principles 1–2 reflect general best practice in price regulation. Principles 3–4 relate to the regulation of wholesale broadband prices and principles 5–7 guide the regulation of retail broadband prices

Table 2: Best practice principles for the regulation of broadband pricing

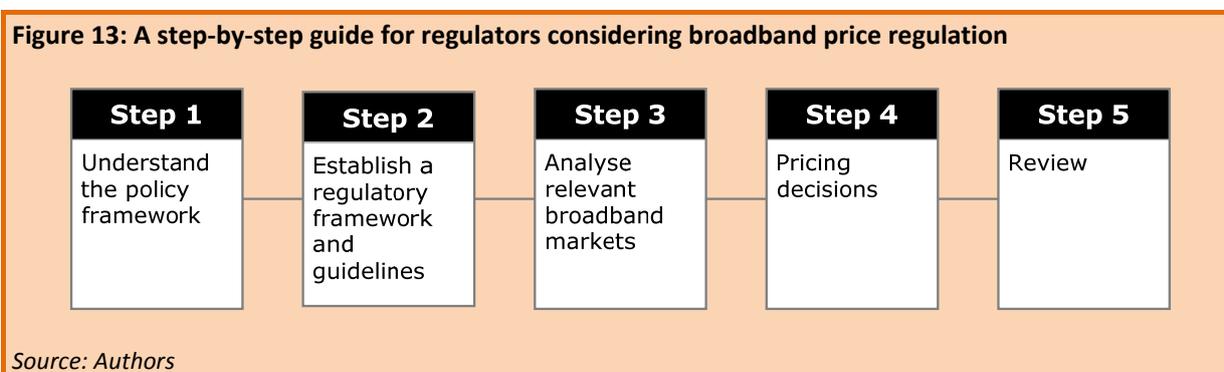
Principle 1	Retail and wholesale prices are best determined by market forces provided that those markets are effectively competitive.
Principle 2	Regulatory intervention in the setting of retail prices for broadband access and applications should be avoided in favour of the facilitation of retail competition by the regulation of wholesale markets for access to broadband facilities and services.
Principle 3:	Regulatory price-setting methodologies for wholesale access to broadband facilities should take into account : Policy objectives, if they exist, that might favour the development of intra-modal competition for fixed broadband services and intra- and inter-modal competition for broadband services as a whole; and Whether the supplier of wholesale facilities access is a pure wholesale operator or a vertically integrated operator with wholesale and retail operations.
Principle 4:	Regulatory price-setting methodologies for wholesale access to broadband applications (including bitstream access) should take into account the following factors: The difficulties in establishing reliable and useful costs for such services, either through cost modelling or benchmarking; The difficulties in establishing suitable discount factors or estimates of avoidable costs when applying techniques based on avoidable retail costs to determine wholesale price levels; and Whether the outcome should be subject to sunset provisions and be permitted only to ensure the early traction of new competitive entrants in the retail broadband market.
Principle 5:	Retail price regulation should be avoided but where it is justified it should be limited to entry-level service pricing and access.

Principle 6:	The only broadband application service price that regulation should be concerned with in a broadband environment is voice and that should be for a limited period of migration to broadband platforms on a transitional basis. The basis for ensuring the availability of low cost options for voice service is for social cohesion and service continuity to meet the expectations of end users whose needs may not be addressed through broadband application service competition. The need for regulation in this area should be reviewed regularly.
Principle 7:	Regulators should avoid regulating the terms and conditions, including prices, of higher speed broadband access and application services. If regulation is necessary, it is best applied as ex post competition regulation directed at anti-competitive behaviour.

Source: Authors

A step-by-step guide for regulator’s considering broadband price regulation

A regulator that is considering regulation of broadband pricing faces many difficult decisions. Figure 13 sets out a step-by-step process to make it easier.



Source: Authors

Step 1: Understand the policy framework

It is essential that the regulator fully understands the policy framework outlined in enabling legislation to ensure that its actions are consistent with the government’s overarching policy objectives. The regulator should look to ensure that the policy intent is clear and that it is given adequate powers to establish and implement a regulatory framework. Quite often the policy framework provided for in legislation will be very general and may include a range of objectives that cannot all be maximised at the same time. In such circumstances the regulator must ensure that it has the power and discretion to determine the relative priority and weight that it will give to the various objectives in different situations. Although the policy framework set out in legislation or in government statements of policy are a given for the regulator, if the policy framework is inadequate in critical respects the regulator has a general responsibility to draw that to attention of the government. In some cases, the regulator may actually be empowered or otherwise invited to recommend specific ways to address the situation.

Step 2: Establish a regulatory framework and guidelines

Based on the overall policy framework, the regulator needs to prepare the rules that will apply should it be required to intervene on broadband pricing issues. The purpose here is to establish the regulatory goals (consistent with the overarching policy objectives); the circumstances under which the regulator will intervene; and the principles that will be applied if it intervenes. Usually more general regulatory rules are set out in such frameworks and more specific detailed guidance on process and methodological matters might be set out in guidelines. It is possible that a single regulatory instrument might suffice. The purpose

of the framework and guidelines is to increase the levels of regulatory certainty for current and potential investors.

This regulatory framework should seek to ensure that competition is encouraged and protected wherever it is viable in the overall broadband supply chain. Where competition is not viable – i.e. where there is a market failure – the framework should provide for intervention by the regulator that ensures outcomes that best correspond to the outcomes that would be expected from the interplay of competitive forces. It follows that the regulatory framework will outline the need for regular market reviews to analyse where there is continuing market failure and where there is dominance. In the absence of dominance, markets should be considered to be competitive and it will usually be left to the general competition law to be applied ex post to address issues associated with anti-competitive behaviour.

Even if there is some evidence of market power being exercised in a market for broadband services, this will not automatically result in the regulator intervening and imposing ex ante regulatory measures. In developing markets, such as broadband, there is an importance role for forbearance, or at least for regulatory caution.

The regulatory framework should establish criteria for determining a market's susceptibility to ex ante regulation for dominance. The best test is the cumulative three criteria test applied in the European Union (refer Box 3 above).

This test requires that ex ante regulation for dominance in all telecommunications/ICT markets, including broadband services markets, should only be applied when:

- (1) there are high and continuing barriers to market entry;
- (2) notwithstanding such barriers, that there is no tendency towards effective competition in the market; and
- (3) that ex post regulation will be inadequate to address concerns raised by the risks associated with dominance.

The regulatory guidelines should indicate the range of remedies that might be imposed ex ante to address the risks of harm from dominance, and how these might be applied in the case of all types of dominant markets, including wholesale and retail markets for broadband access and services. In all cases the regulator will be enjoined to intervene as lightly as possible whilst still providing an effective remedy proportionate to the risk of harm to competition and consumer interests.

The framework should also indicate that the regulator will seek to regulate for dominance in wholesale broadband access and service markets first, and only if that is inadequate will the regulator seek to regulate retail broadband access and service markets.

The guidelines will specify the basis on which regulated prices for access to facilities and for wholesale broadband services (such as bitstream access) will be determined if the regulator needs to intervene and set them. They will be based on cost, but the cost standard – i.e. whether fully allocated costs or some form of incremental costs – will be dependent on the policy and regulatory objectives that are being pursued in the context of the particular market.

Should the regulator seek to regulate the prices of retail broadband access and services in the absence of effective retail competition the regulatory mechanism, including cost standard, should be chosen with care to ensure that it does not result in deterring efficient competitive entry that might otherwise have occurred, and to ensure that pricing and service performance expectations by consumers are suitably reflected but only for transitional or platform migration periods.

Step 3: Analyse relevant broadband markets

With the regulatory framework and guidelines in place, the regulator should undertake analyses of relevant broadband markets consistent with the procedures set out in the regulatory framework. The market analysis will have four parts, namely:

- (a) Defining telecommunications network services markets
- (b) Determining which markets might be susceptible to ex ante regulation for dominance (a filtering process)
- (c) Determining which operators are dominant in which relevant markets
- (d) Determining what remedies to apply, bearing in mind the need for remedies to be reasonable and proportionate, and to be the least intrusive possible while still being adequate and effective.²²

Step 4: Pricing Decisions

If as a result of a market analysis process the regulator proposes ex ante remedies that involve the setting or approving of prices for broadband access and application services, the regulator should ensure that the prices are cost-related and are determined in a manner consistent with the methodologies set out in the regulatory framework and guidelines. The regulator should adopt a cautious approach and recognise the pitfalls associated with benchmarks for cost-based prices discussed above, and the challenges in using cost models in the case of broadband application services (at both wholesale and retail levels).

Step 5: Review

The telecommunications/ICT sector is now in a period of major change driven by the changes in the underlying technologies that are being commercially deployed – most particularly cellular mobile and IP packet switching technologies – resulting in massive and rapid changes in investment, service deployment, convergence at all levels, cost and cost relationships, market structures, market relationships and consumer demands and expectations. In this environment reliance on legacy regulation is inappropriate and dangerous. Therefore the regular re-examination of regulation for currency and facilitation of future growth and development of the market in a broadband environment is vital. Regulatory frameworks and guidance, and market analyses, will need to be reviewed regularly with fairly short periods of 2–4 years between reviews reflecting the speed and uncertainty of change.

²² See for example the KSA CITC report in previous end-note, and also the *Regulatory Framework for Designation of Markets and Dominance in the Telecom Sector*, www.citc.gov.sa/English/RulesandSystems/RegulatoryDocuments/OtherRegulatoryDocuments/Pages/default.aspx



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