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The regulation of next generation access networks and the draft Commission Recommendation

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Summary

The draft European Commission recommendation of 12 June 2009 on regulated access to next generation access (NGA) focuses on fixed access. This paper comments on the recommendation and considers the wider context in terms of market developments, namely the development of internet based applications and content delivery and the growth of wireless broadband, devices and applications.

The objective of the recommendation is to clarify the regulatory approach to NGA and to avoid "inappropriate divergence of regulatory approaches." The development of a framework for regulation of NGA ahead of market analysis and assessment of significant market power (SMP) is welcome, since it provides potential investors with greater clarity ahead of investment. However, it is important that ex ante guidance is not overly prescriptive given the uncertainty surrounding the market for NGA and the need to allow future market and regulatory innovation.

The market context is changing – driven by the internet and internet based applications and content delivery. This is disrupting existing value chains and opening up new forms of competition and market entry. Existing modes of competition in telecommunications, which have taken time to establish and heavily influence regulatory thinking, may therefore be less relevant in future. In particular, access to networks and network unbundling may be relatively less important in support of competition and innovation in future - provided consumers have access to applications and content provided over the internet.

A further market development is the emergence of wireless data services, devices and applications. Wireless may be a strong competitor to copper based DSL access in future, particularly once UHF spectrum – which offers wide channels to support bandwidth and lower frequencies which improve rural and indoor coverage - is reallocated to mobile to support LTE. Fixed and wireless will also be complements with fibre increasingly required to support higher traffic levels at base stations and WiFi access points. These developments have implications for the extent of competition in geographic sub-markets, the economics of co-investment and for the sustainability of existing obligations relating to copper networks. Fixed and wireless NGA should be considered together.

The development of protocols for interconnection of optical networks and new bitstream remedies is recommended. This is welcome as "active remedies" may play a greater role in future given the economics of NGA investment and competition. Active remedies may also support interoperability of service provision across multiple access networks nationally and across Europe as a whole.

The draft recommends a default regulatory position of cost reflective access to passive infrastructure where feasible, complemented by active bitstream access if infrastructure access on an unbundled basis is not provided. The emphasis on cost reflectivity in relation to both active and passive remedies may undermine prospects for efficient and timely investment in NGA since the value, rather than cost alone, of alternative investment options must be reflected in investment and pricing decisions to incentivise efficient investment.

The draft recommends that cost orientation might not be required in defined circumstances where particular regulatory approaches (functional separation), business models (FTTH co-investment by competitors in the downstream market) or technologies (FTTH with multiple fibre) are adopted. This represents a departure from an approach where regulation is more neutral regarding investment choices and market structure and is focussed on circumstances where SMP applies. There are three risks with this approach:

• First, it may provide insufficient protection for consumers in the transition to NGA where access is a bottleneck and no price controls apply.

• Second, it may unduly favour specific technologies, business models or approaches to regulation given the wide gap between the default regulatory position and the alternative applied in defined circumstances.

• Third, it may limit the scope for other forms of business and regulatory innovation which may prove desirable. For example, the development of long-term contracts and/or approaches in which consumer choice over the mode of access (wireless or fixed, as is as is proposed in Finland) and capability of access products consumers desire plays a greater role in determining outcomes.

A regulatory framework which offered more flexibility in terms of the default regulatory option and a less prescriptive approach to alternatives might be preferable. One approach, which may complement a relaxation of ex ante price controls to support efficient investment whilst offering a degree of consumer protection, is anchor product regulation.

Under anchor product regulation consumers would be assured of continued access to broadband services over NGA that correspond to those over legacy copper networks via emulation products (or via continuation of copper based access if legacy and NGA networks overlap). Anchor product regulation would serve two purposes:

• First, it would provide an assurance that consumers who do not want advanced services will not be made worse off by investment via the offer of more advanced and higher priced services and the withdrawal of legacy services.

• Second, it would provide a restraint on pricing of more advanced services (in addition to any competitive pressures) which is less binding that cost based regulation, thereby supporting efficient investment.

The draft also recommends a notice period of around 5 years for removal of legacy points of interconnection. This proposal appears to reflect the interests of existing competitors rather than consumers per se. A comprehensive framework for the timely phase-out of copper is required to facilitate efficient NGA investment. Specifically, the draft does not address the set of issues related to re-specification of universality for voice services on technology neutral terms. This is required to allow copper switch-off and promote efficient and timely investment in fixed and mobile NGA.

Draft Commission Recommendation

On 12 June 2009 the Commission published a draft Recommendation on regulated access to next generation access networks (NGA).[1] The draft focuses on fixed NGA.

Proposed regulatory approach

The draft proposes, in relation to undertakings with significant market power, that:

• Access to civil engineering infrastructure (ducts, poles etc) should be provided on cost oriented and in accord with the principles of equivalence. The price of access should not be a geographical average in the presence of substantial cost differences between areas.

• Effective physical access remedies might render imposition of an obligation of wholesale broadband access unnecessary. In particular where access to the unbundled fibre loop is available, particularly on a point-to-point basis.

• New access remedies in terms of interfaces for interconnection of optical networks and bitstream remedies may be required and NRAs should co-operate with each other, international standards bodies and industry stakeholders to develop common standards.

• Wholesale bitstream access prices should be cost oriented with different prices for different bitstream products to the extent that such price differences can be justified by the underlying costs of service provision; except where

– There is a proven track record of functional separation that has resulted in fully equivalent access to NGA and where there is a sufficient competitive constraint on the operator's downstream arm.

• Cost oriented access to the unbundled fibre loop should be provided in the case of co-investment into FTTH; but with no requirement for cost orientation where:

– The SMP operator has jointly with at least one other provider of electronic communications services competing on the downstream market deployed an FTTH network; and

– The co-investors deploy multiple fibre lines; and

– The co-investment project is not exclusive (timely notice should be given to potentially interested parties who could participate on the same terms and conditions); and

– All co-investors enjoy equivalent access to the jointly deployed infrastructure.

• Decommissioning of existing points of interconnection in relation to copper access should be subject to a transitional period, in general 5 years.

Context

The Commission draft:

• Assumes that:

– Cost orientation is consistent with efficient investment (paragraph 13).

– Networks based on multiple fibre lines can be deployed at marginally higher cost than single fibre networks (paragraph 19).

[1] http://ec.europa.eu/information_society/policy/ecomm/doc/library/public_consult/nga_2/090611_nga_recommendation_spc.pdf

• Does not mention or discuss:

– The internet and, in particular, access to internet based applications and the possible implications for competition and regulation.

– Next generation wireless access and, in particular, its role as a potential substitute and/or complement to next generation fixed access and the possible implications for regulation.

– Existing platform specific entitlements or obligations, such as the allocation of UHF spectrum for terrestrial broadcasting and the USO for voice and terrestrial broadcasting coverage obligations, and their possible implications for a transition to next generation networks.

Market context

The drafts omission of any discussion of the internet and next generation wireless is striking, as developments in both areas seem likely to play a key role in the evolution of network access, competition and service provision in future.

The internet

The internet is the key enabler of demand for next generation broadband – it is the killer app. It is also an open platform for the development of new services including applications and content delivery. The internet has allowed some services to become global rather than local, and content and applications are starting to be delivered direct to end users.

This trend is facilitating entry into the communications and content markets by businesses from the global internet market. Even though some applications will be free to end users, and most will not be offered by vertically integrated service providers, they will nevertheless increase end user willingness to pay for next generation fixed and wireless access.

The internet is disrupting existing vertical value chains and is facilitating network independent competition. As Ofcom noted on 31 July 2009:[2]

"In the extreme, the competition model in telecoms sector may begin to resemble that found on the Internet more closely. This envisages network operators focussing on the provision of generic conveyance services, whilst a multiplicity of independent service providers develop and deliver rich applications which run over these generic conveyance networks."

The emphasis in the draft on protecting legacy access models and competitors may therefore act against consumers' interests – to the extent that it slows the development of next generation networks and services.

Next generation wireless

Long term evolution (LTE) offers a substantial peak and average speed improvement and much lower latency than current 3G technology. Verizon anticipate that in practice LTE will deliver an average performance of 5 to 12 Mbps.3 LTE also offers lower latency and a five-fold reduction in the cost per MB carried relative to 3G. The European Commission has also given priority to the earliest possible reallocation of spectrum for wireless broadband.[4]

LTE might therefore be expected to compete with copper based DSL. LTE will also compete with fibre for those customers who have more modest internet use in terms of peak speed and monthly data requirements. However, fibre is also complementary to LTE as it can accommodate the higher traffic levels to base stations. As William Webb (2007) put it:

> *"The extent to which fibre cables are brought within 100-300 metres of people's homes will determine the viability of massive upgrade of wider area mobile radio data speeds."*[5]

In the US, where analogue TV was switched off on 12 June 2009 and 700 MHz spectrum has been awarded for mobile broadband and public safety, the deployment of LTE networks has begun. Verizon's business intentions therefore provide an indication of the possible future impact of LTE in Europe. Verizon plan to offer service to 100 million customers by the end of 2010.

At an investor conference in May 2009, Verizon set out their view in relation to substitution and complementarity of LTE, copper and fibre as follows (from transcript of analyst question and answer session):[6]

"...the fact that we have 5 to 12 Mb speeds on average to the customer suggests that we're going to be able to supplant a good deal of fixed services as well as we deploy LTE just simply as a result of the speed and the improved latency that you see."

"I think you need to look at the future as being fiber fed to virtually any cell site."

"What in fact I'm saying is that there is opportunity throughout the country where we have LTE for a customer to decide that this is exactly what they need for Internet connectivity and to buy a package and use it in a fixed service in their home."

"With regards to other flavors of DSL, I'm not convinced that they're economically viable for the long-term. There's a lot of complexity to them. And they are also copper-based and I'm not sure that I want to spend significant amounts of incremental do-

[2] Ofcom. July 2009. Next generation network: responding to recent developments to protect consumers, promote effective competition and secure efficient investment. http://www.ofcom.org.uk/consult/condocs/ngndevelopments/

[3] The RBC Capital Markets' 2009 Technology, Media & Communications Conference. http://investor.verizon.com/news/20090609/20090609_transcript.pdf

[4] http://ec.europa.eu/information_society/policy/ecomm/radio_spectrum/topics/reorg/pubcons_digdiv_200907/index_en.htm

[5] William Webb. 2007. "Wireless communications: the future." John Wiley. Page 209.

[6] The RBC Capital Markets' 2009 Technology, Media & Communications Conference. http://investor.verizon.com/news/20090609/20090609_transcript.pdf

llars upon further investment in copper plane given the promise that both FiOS or fiber, if you will, and wireless."

Next generation wireless will be both a substitute and complement to fixed access, and a joined up view of the potential and regulatory implications of fixed and mobile next generation access is required. There are a number of potential elements to this, in particular:

• Wireless may play a greater role in terms of competition and levels of competition may differ more by location in future.

• Fixed and mobile NGA will to some extent be complements and this may be relevant to co-investment or other long term relationships.

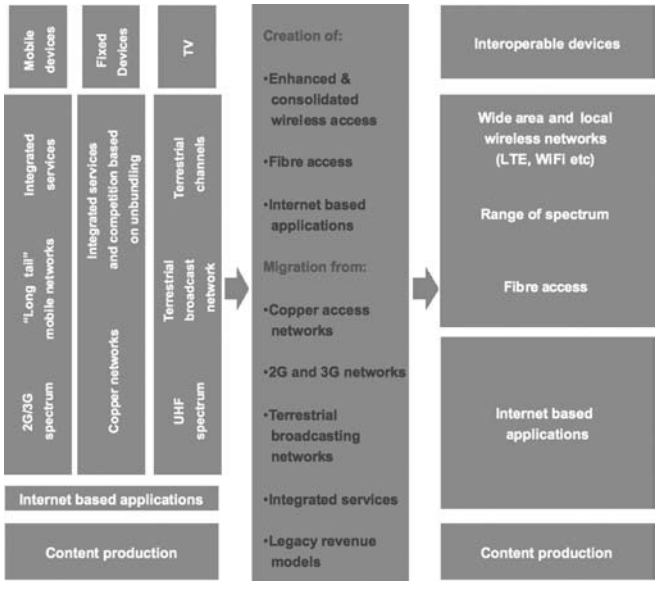
• A focus on "middle mile" fibre – as in Finland – may be appropriate with competition for last mile access.

• Existing obligations specific to copper access may prove unsustainable if LTE undermines copper based business models.

Value chain transformation and regulatory implications

Figure 1 summarises the transformation of networks and services that we envisage occurring in the medium term.

Figure 1: Potential transformation of value chains



Note: radio and satellite TV, which should survive the transition in some form, are not shown.[7]

Figure 1 illustrates an evolution of convergence from existing players entering each others markets and offering bundles (LHS) to an outcome where (RHS):

• Applications, services and content delivered via the internet replace existing integrated platform specific service models. Access platforms may consolidate with fibre and wireless replacing copper based DSL and fibre, cable and satellite progressively replacing terrestrial broadcasting and a possible consolidation of wireless radio networks.

• Bundling of services by service providers may give way to device based integration of applications by consumers. Personal devices and their associated software will play a central role.

These changes require a transformation of telecommunications and broadcasting networks and services subject to sector specific regulation. The economics of innovation in computing and internet markets may now be more relevant than conventional regulatory economic thinking.[8] They also require a transformation of existing regulation.

The shift that is occurring will undermine not only legacy business models, but also current ways of thinking about policy and regulation. A long history of legacy technology, market structures and institutions have led to habitual modes of thought which are an impediment to the next phase of ICT driven productivity growth. To make progress we must escape from the following modes of thought:

• An approach to regulation which does not provide incentives for efficient investment. The pre-existence of legacy access infrastructure has conditioned an approach which does not provide appropriate incentives for the large and uncertain investment transition associated with next generation broadband.

• A view that mandated access to infrastructure, particularly via so called "passive remedies" involving access to network elements or "dark fibre", is required to support competition. The existence of vertically integrated single service networks has conditioned this view.

• An approach to universality in telecommunications and broadcasting markets based on cross subsidy and implicit transfers. A lack of competition in telecommunications and broadcasting markets supported this approach historically.

Policy issues that need to be addressed

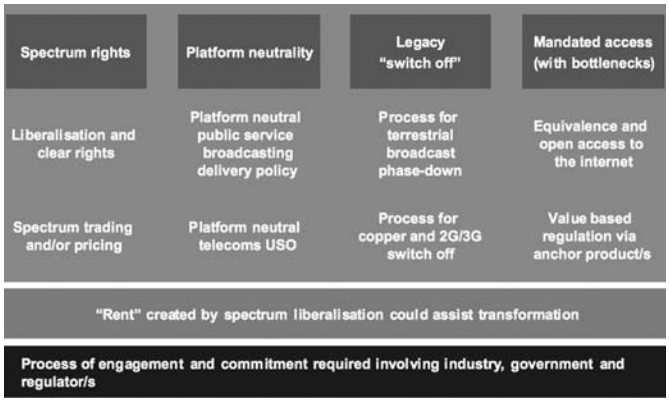
The internet driven evolution of networks, applications and competition requires a reappraisal of policy in relation to spectrum, platforms specific obligations and legacy platform switch off and current approaches to mandated access. NGA fixed should not

[7] The reason that satellite TV is expected to survive whilst terrestrial broadcasting is not is that the UHF spectrum utilised for terrestrial broadcasting has a higher opportunity cost given its value for mobile broadband, and satellite has much greater capacity to accommodate high definition TV channels. FM radio also utilises spectrum that has limited alternative use value and might prove a complement to internet based services and applications.

[8] Greenstein. August 2007. "Innovative conduct in U.S. computing and internet markets." http://www.kellogg.northwestern.edu/faculty/greenstein/images/htm/Research/WP/InnoEconHandbook-Greenstein-final.pdf
Joseph Farrell & Philip J. Weiser. Fall 2003. "Modularity, vertical integration, and open access policies: towards a convergence of antitrust and regulation in the internet age." Harvard Journal of Law & Technology, Volume 17 (1). Page 86. http://jolt.law.harvard.edu/articles/pdf/v17/17HarvJLTech085.pdf

be considered in isolation from these policy issues, and the current model on which competition in telecommunications has developed should be reappraised. Figure 2 sets out a high level map of the key issues involved.

Figure 2: Complementary spectrum, broadcasting and telecoms policy reform



The issues set out in Figure 2 are now considered and related to the draft Recommendation.

Spectrum rights and mobile broadband

The policy prescription here is simple in principle, namely to create the framework within which spectrum can be reallocated in a timely manner as convergence proceeds based on the value of competing uses of spectrum. However, in relation to terrestrial broadcasting, this is a radical proposition since existing rights are currently non-tradable and may be reserved for terrestrial broadcasting as part of the public service broadcasting policy package.

The European Commission has given priority to the earliest possible reallocation of spectrum for wireless broadband.9 Further, a number of national regulators are advancing plans for UHF spectrum reallocation, for example, proposals by the German Federal Network Agency in relation to allocation of 790 MHz to 862 MHz.10 UHF spectrum will support LTE via wide channels which offer efficiency and speed, and improved rural an in-building coverage.

An integrated view of fixed and mobile broadband raises other policy questions. In particular, the impact on competition by geographic location, whether fibre close enough to the home (rather than FTTH) would facilitate "last mile" competition between fixed and wireless and the impact of LTE on copper network viability.

In Finland it is proposed to extend fibre to within 2 km of virtually all households by 2015 with central funding up to 67% of the cost (state 33%, regions 27%, EU 7%). Customers would be expected to pay for their own connection, fixed or wireless, though tax credits will be provided.[11] In the near term 1 Mbps average down load speeds are anticipated by 2010 utilising wireless OFDM at 450 MHz.

An integrated view of fixed and mobile evolution might also contemplate co-investment by fixed and mobile operators in NGA fixed. The draft proposals focus on co-investment in relation to operators "competing on the downstream market" – a position which may narrow the focus to fixed operators given the reluctance to date of NRAs to consider mobile a downstream competitor to fixed.

Platform neutrality and legacy network switch-off

Current requirements in relation to competitor access and voice universality are typically specified in technology specific terms. If this situation persists it will be a barrier to NGA investment since potential cost savings from copper network switch off would be unavailable. Continued imposition of obligations in relation to legacy platforms might also ultimately undermine the viability of incumbent operators.[12]

Voice universality requirements in relation to fixed need to be made technology neutral or dropped, and the requirement to maintain copper loops and legacy points of interconnection also need to be phased out.[13] In Finland, policy makers have recognised the need to plan for copper network switch-off with proposals to re-specify voice universality in terms of mobile and for allowing fixed switch off subject to one year's notice.[14]

The proposal in the draft recommendation for a notice period of around 5 years may harm prospects for NGA investment via the ongoing cost implications and seems more focussed on the interests of existing local loop unbundlers than consumers. With NGA competition may be based on bitstream network access and access to applications over the internet.

In relation to broadcasting, requirements for near universal access are currently not specified on a platform neutral basis. This may inhibit a shift from terrestrial broadcasting to cable, satellite and broadband distribution, thereby limiting a potential source of demand for next generation fixed access and delaying additional reallocation of UHF spectrum for next generation wireless. There is a precedent for a platform neutral approach to broadcasting from the requirement, consistent with state aid

[9] http://ec.europa.eu/information_society/policy/ecomm/radio_spectrum/topics/reorg/pubcons_digdiv_200907/index_en.htm
[10] http://www.bundesnetzagentur.de/enid/90037614635b404e171fd106db9012ae,0/Frequency_Assignment/Proceedings_for_the_award_of_mobile_spectrum_3fs.html#eckpunkte
[11] Ministry of Transport and Communications Finland.
http://www.lvm.fi/web/en/pressreleases/view/660335
http://www.lvm.fi/web/en/pressreleases/view/518973
http://www.lvm.fi/web/en/publication/view/278249
[12] The Economist. 15 August. America loses its landlines. http://www.economist.com/displayStory.cfm?story_id=14214847
[13] In particular, where FTTH investment occurs the network would no longer provide power to support telephony service in the event of a power outage at the customer premise.
[14] The Ministry of Transport and Communications. 2008. "A phone for everyone – from fixed to mobile services."
http://www.lvm.fi/fileserver/a%20phone%20for%20everyone%20–%20from%20fixed%20to%20mobile%20services.pdf

rules that financial support for digital switchover be provided on a platform neutral basis.

Mandated access

The proposed default position in terms of mandated access in relation to undertakings with significant market power focuses on cost reflectivity. In addition, a number of specific options which would permit a more relaxed regulatory approach are proposed in the draft recommendation. It is argued below and in Appendix A that the proposals do not provide sufficient flexibility to support efficient and timely investment in NGA. They are based on an outdated view of competition and may, in relation to some of the proposals, offer insufficient protection for consumers.

Active bitsteam access

The steer towards development of protocols and interfaces for interconnection of optimal networks and new bitstream remedies is welcome, as so called active remedies may play a greater role in future given the economics of NGA investment and competition in an environment. Active remedies are also needed to supported interoperability of service provision across multiple access networks nationally and across Europe.

Price flexibility and efficient and timely investment

Cost reflectivity will not deliver efficient and timely investment since the value of alternative investment options to end users will not be properly reflected in investment decisions, and price differentiation based on value is required to support timely investment. Appendix A sets out the reasoning behind this conclusion, and puts forward an alternative approach – anchor product regulation.

Anchor product regulation involves a commitment that existing service levels – perhaps the average levels - will continue to be available at existing prices in the transition to NGA. In other words anchor products are a virtual proxy for continued provision of copper based DSL. Anchor products would facilitate removal of copper and would act as a discipline on pricing of more advanced services offered over NGA.

Discrimination in a multiservice platform environment

The presumption that service providers have an incentive to discriminate against third party providers rests on experience and analysis of vertically integrated single service networks rather than on theoretically unambiguous results.[15]

The growing diversity of applications, from voice historically to a multiplicity of internet-based applications today (across all of which the platform provider cannot hope to be competent), will tend to diminish or eliminate the incentive for a vertically integrated provider to discriminate against third party applications providers. Many web services are now open to third party innovation, and platforms such as the iPhone allow third party applications – an approach which has proved profitable.

Co-investment

The draft proposes that an SMP operator who has jointly invested to deploy an FTTH (and not FTTC) network with at least one other provider of electronic communications services competing on the downstream market might be exempt from price regulation.

The focus in the draft in terms of the rationale for this approach is on risk sharing – yet the risk of insufficient demand and willingness to pay remains and capital markets are generally thought to offer a mechanism for diversification of risk. Further, the proposals favour initial investors over entrants and may not provide sufficient protection for customers if the co-investors had SMP and no price restraint was in place.

Nevertheless there may be sound reasons for considering co-investment if it lowers the costs of NGA and if it helps overcome any problems in terms of strategic complementarity,[16] for example, between fixed and wireless NGA rollout. Anchor product regulation might provide consumer protection alongside a co-investment model. Further the approach adopted in Finland of focussing aid for fibre investment in the "middle mile" and facilitating last mile fixed-wireless competition is an alternative approach to addressing strategic complementarity.

Long-term contracts

A further option is long term contracts with customers. This approach is applied in relation to broadcast transmission services in the UK and natural gas pipelines in the US. Neither approach relies exclusively on contracts. In the UK there is a cost reflective reference offer available to broadcasters alongside the option of adjudication.[17] In the US there is a regulatory backdrop to long term contracts and capacity trading for natural gas pipelines in the US.[18] Nevertheless, long term contracts have some attractive features and serve to illustrate that there may be alternative options to those currently envisaged and sufficient regulatory flexibility should be maintained to allow their consideration.

Prescriptive versus "neutral" approaches

The draft proposals offer some flexibility in terms of regulatory approach, but only in very prescribed circumstances where particular regulatory approaches (functional separation), business models (FTTH co-investment) or technologies (FTTH with mul-

[15] David Mandy. 2000. "Killing the golden goose that may have laid the golden egg: only the data knows whether sabotage pays." The Journal of Regulatory Economics, 17:2.

[16] Strategic complementarity occurs when investment by one organisation increases the incremental payoff to investment by others. This means that profit maximising behaviour by independent firms will not result in the best outcome. Hence a co-ordinated strategy is required to reach the best outcome. John Roberts. 2004. The modern firm. Oxford University Press.

[17] http://adjudicator-bts.org.uk/index.htm

[18] Jeff Makholm. June 2007. "Seeking competition and supply security in natural gas: the US experience and European challenge. http://www.nera.com/Publication.asp?p_ID=3198

tiple fibre) are adopted. There are two risks with this approach. First, that it unduly favours the approaches identified as preferred approaches. Second, that it does not leave space for future innovation in terms of business and regulatory approaches.

An approach which offered more flexibility in terms of the default regulatory option and a more nuanced and less prescriptive approach to alternatives might be preferable.

The need for value reflective pricing

Efficient and timely investment

The decision over what investment is the right one and when to make it is fundamentally a judgment. Analysis can help inform the decision, but there is no objective method for making the right investment decision, establishing appropriate ownership and contractual boundaries for the business, and establishing the right products and prices over time. In this environment, there is considerable risk in governments or regulators attempting to second guess entrepreneurial decisions.

The problem is compounded by the fact that investment decisions, demand, pricing and the cost of capital are all endogenous i.e. they depend on one another. It is not possible to fix one without impacting on the others, and questions such as "what is the right risk adjusted cost of capital?" does not have an answer independent of investment choices, pricing and demand.

Intuitively, the reason that conventional cost based regulation and cost reflective pricing will not deliver good outcomes is that we are seeking to maximise value, and value depends on benefits as well as costs. A narrow focus on cost is very unlikely to maximise value since the least cost option – or the option a regulator facing very different incentives to an investor would prefer – is unlikely to be the most valued option. Incentives for investors to weigh upside and downside risk therefore need to be preserved and a cost based approach to regulation, irrespective of allowance for risk, cannot be expected to deliver efficient and timely investment.

Given information asymmetries between end users, managers, owners and regulators efficiency is promoted by allowing parties to keep some surplus (known as "information rents") in return for the revelation of efficient behaviour.[19] Such rents differ from pure monopoly rents since they promote rather than harm economic efficiency by aligning different parties interests – in this case the interest in efficient and timely investment.

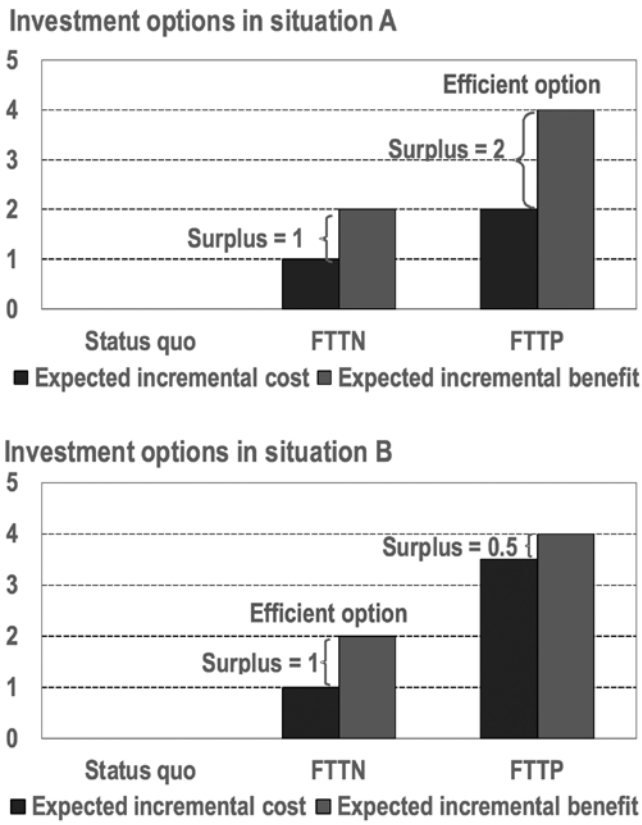
If there were only one investment option under consideration, the problem of incentivising efficient investment is in principle, but not in practice, trivial. One would simply set a price that allows an expected return just sufficient to fund the investment.

However, as Box A.1 seeks to illustrate, the problem is deeper than choosing the correct return to allow, since in practice there are always multiple investment options (for example, involving different technologies and/or timing), and the question is not whether to invest or not, but when and how to invest. A binding regulated price or price cap, or the expectation of one, is likely to distort investment choices when there is a portfolio of options.

The problem of incentivising investment which maximises value

Figure A-1 sets out an investment decision problem involving the status quo i.e. zero incremental cost and benefit, and FTTC and FTTH investment options which involve incremental costs and benefits which depend on circumstances (for example, timing or location represented by situations A and B). It is assumed that FTTH is both more expensive and more valuable than FTTC, and that the optimal value maximising investment depends on the circumstances.

Figure A.1: Efficient next generation broadband investment choices



In terms of value (incremental benefit less incremental cost), Option 3 is preferred in situation A (a surplus of 2) and Option 2 is preferred in situation B (a surplus of 1). Under the regulatory approaches considered above – utility style and LRIC – inefficiency could arise as follows. Under utility style regulation, if the return on capital is too low, Option 1 (no investment) would be chosen in both situations, whilst if the return on capital were too high, Option 3 would be chosen in both situations, and this would involve inefficient "gold plating" in situation B. Under LRIC with returns capped, the investor would prefer Option 2 in both situations if the price cap were in the range 1 to 3. If the price

[19] Laffont and Tirole. 2000. "Competition in telecommunications." MIT Press.

cap exceeds 3, the investor can generate a greater surplus by making the efficient investments in both situations.

If the information required to assess efficient investment in each location were common knowledge, the regulatory problem would be trivial - the regulator could simply offer returns conditional on making the efficient investment in each location. In practice, a judgement is required over which investment to make in each location given uncertainty over the value (and therefore customer willingness to pay) for alternatives. In these circumstances, it is essential that investors face incentives to make the right decision ex ante, in other words, to bear some of the potential risk and reward and to be able to earn information rents.

The conclusion from this analysis is that it is not in general possible to decentralise the investment decision with an arms' length regulated price or pricing approach and achieve efficient value maximising investment. Sufficient price flexibility is required to allow returns to reflect value. In today's environment, where the underlying infrastructure is in the ground, this is less of a concern. In the transition to, and ongoing transformation of next generation access, price flexibility is essential for efficient investment.

Efficient pricing over time

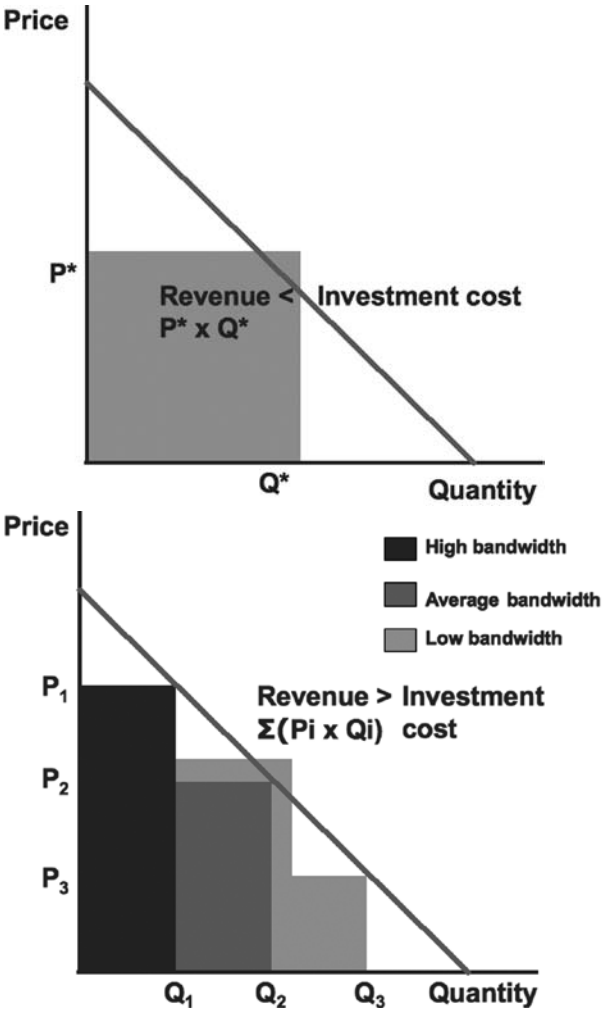
The previous section concluded that regulating overall returns via comprehensive price controls or price caps could distort investment choices since the value of alternative prospective investment options is unlikely to impact much if at all on investment decisions if anticipated regulated prices are "cost based". In this section we turn to the question of how to achieve efficient pricing in support of timely and efficient investment, in particular the dynamic structure of prices including price differentiation over time.

With next generation access a greater proportion of costs will be fixed up-front capital costs which are common across services since an next generation access is a multi-service platform. There will therefore be no sound cost oriented basis for allocating overall access costs across services. Further, there are sound grounds for differentiating prices for different service levels on the basis of demand.

Since demand for different services and different access service attributes can be expected to change over time – potentially in unpredictable ways - as next generation access and the ecosystem of applications it supports matures, there is a need for price flexibility and differentiation across periods in time. In other words, experimentation in products and pricing is needed to work out what customers want and how much they will pay for it. For example, less might be charged for the access bandwidth required for a voice call versus a HD video call, and the premium on high bandwidth might be expected to grow over time as voice only service revenues are eroded by mobile and demand for services such as two way HD video calling and collaboration grows. Dynamic value - rather than cost reflective - pricing is an efficient means of promoting investment.

In particular, a single cost reflective price may simply raise insufficient revenue to support timely investment, even where overall willingness to pay exceeds investment costs. Valletti (2005) analyses an example of pricing according to differences in demand and incentives to invest in R&D, and shows that ex ante incentives to invest increase with price differentiation.[20] However, it is important to note that literature on the optimality (or not) of price differentiation does not consider the dynamic question when investment choices are involved. The case for price flexibility to allow price differentiation and dynamic pricing can however be illustrated via a simple specific example.

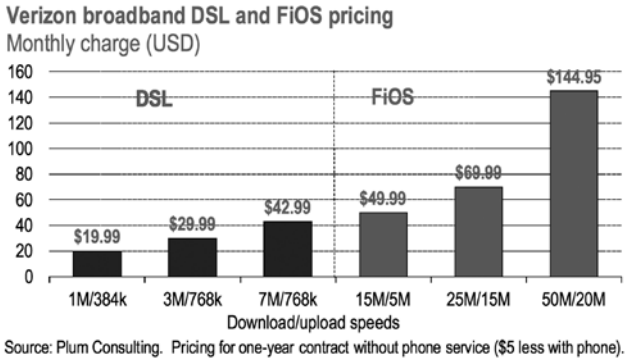
Figure A-3 illustrates how revenue with a single price may be insufficient to support investment even though overall willingness to pay is sufficient. A single tariff yields, at most, the revenue represented by the square P* x Q* which is less than the investment cost shown by the larger square. Figure A-4 illustrates how price differentiation could enable investment to proceed since the overall surplus captured via differentiated pricing is sufficient to support investment.



[19] Tommaso M. Valletti. September 2006. "Differential pricing, parallel trade, and the incentive to invest." Journal of International Economics. Volume 70, Issue 1. Pages 314-32. We note that this analysis "…assumed linear demand curves and that all markets are served under both differential and uniform pricing. This has assumed away the potential market-expanding effects of differential pricing by opening up new markets." In relation to NGA we are of course also concerned also with the opening up of new markets, a prospect that is made more likely if price discrimination is allowed.

Over time the slope of the demand curve (the red diagonal line) illustrated in Figure A-3 and Figure A-4 will change with demand for high bandwidth services growing, and demand for low bandwidth services, particularly the bandwidth required to support voice potentially declining as mobile substitutes for fixed voice. The optimal degree of price differentiation can therefore be expected to change over time, and given the uncertainty over demand for bandwidth now and in the future efficient pricing requires a difficult judgement to be made. Given the uncertainty involved, there is also a need for sufficient pricing flexibility to allow for learning and correction.

The evidence from early deployments of next generation networks shows the importance in practice of product and price experimentation to take-up. Figure A-5 illustrates price differentiation by bandwidth based on the pricing plans offered by Verizon for their "FiOS" FTTH service (alongside a comparison with published price plans for DSL).



Source: Plum Consulting. Pricing for one-year contract without phone service ($5 less with phone).

Higher prices are charged for higher bandwidth. Further, the differences in prices by bandwidth are not related to differences in access costs which are identical (though higher costs would be incurred in the core network if higher bandwidth plans were associated with higher traffic levels).

A final question is where price flexibility and differentiation is required if separate wholesale and retail prices are available (the Verizon pricing shown is for retail pricing). The answer is that differentiation must be possible at the wholesale level – otherwise downstream service providers will not be able to sustain differentiation on the basis of access attributes such as bandwidth due to arbitrage i.e. a higher price for higher bandwidth would be arbitraged away by others purchasing an average price wholesale access product.21 Price flexibility is required at the wholesale and retail level to support price differentiation, dynamic pricing and efficient and timely investment.

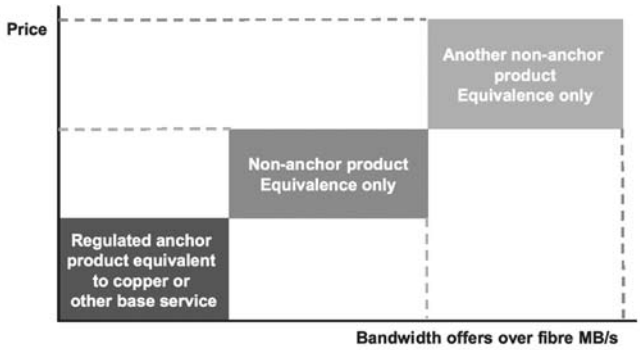
Anchor product regulation

Pricing flexibility, both across services (say bandwidth) and over time, is required to align investor incentives with end user preferences. Prices should reflect value, rather than costs, to foster efficient and timely investment.

However, alongside greater pricing freedom protection against abuse of dominance is required where platform competition is judged insufficient. Essentially there are two ways of delivering this. Either move to "cost plus" utility style regulation, potentially with some form of risk sharing, or move to an approach where overall returns are not regulated but there is still some restraint on monopoly abuse (LRIC based approaches with periodic review are arguably too open to discretion to provide a credible basis for investment).

An intermediate option that has been suggested is anchor product regulation,22 whereby some basic voice and broadband products are subject to price commitments, whilst other higher bandwidth services are offered on non-discriminatory terms but not subject to ex ante price regulation. Such an approach would also improve the prospects for platform competition and/or contractual relationships that reduce the risk of future pressure for more extensive regulation. Figure A.5 illustrates the concept.

Figure A-6: Tiers of wholesale access pricing



In essence:

• Roughly the same price and service levels available over copper are emulated over next generation broadband i.e. end users are not made worse off by the transition.

• Access prices are not derived on a cost oriented basis since those wholesale prices that are controlled are set on the basis of retail prices on the previous platform on a retail minus basis.

• Non-anchor product prices would be set by the platform owner.

The approach would leave a substantial measure of risk and reward with the investor, whilst ensuring that customers who do not value the new services next generation broadband enables can continue to purchase products over next generation broadband that match the performance legacy products.

[21] Lewin, Williamson and Cave. 2009. Regulating next-generation fixed access to telecommunications services. Info, Volume 11(4).
[22] Brian Williamson. July 2007. "New regulatory approaches to next generation access." http://www.broadbanduk.org/component/option,com_docman/task,doc_view/gid,944/