EUROPEAN PARLIAMENT

REPORT

Policy Department
Economic and Scientific Policy

Workshop
Next ("Now") Generation Access (NGA):

How to Adapt the Electronic Communications Framework to Foster Investment and Promote Competition for the Benefit of Consumers?

Summary, Briefing Notes and Presentations

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Authors of briefing notes:

Prof. Martin Cave
University of Warwick
Warwick Business School
Centre for Management under Regulation
Coventry, CV4 7AL
Tel: +44-7958-483-709
E-mail: martin.cave@wbs.a.uk

Prof. Dr. Dres. h.c. Arnold Picot
Institute for Information, Organization and Management
Ludwig-Maximilians-Universität München
Ludwigstr. 28
D-80539 München
Tel.: +49-89-21802252
Fax: +49-89-21803685
Email: picot@lmu.de

Administrator:

Maya Gadzheva
Policy Department Economy and Science
DG Internal Policies
European Parliament
Rue Wiertz 60 - ATR 00L012
B-1047 Brussels
Tel: +32-2-2832858
Fax: +32-2-2846929
E-mail: maya.gadzheva@europarl.europa.eu

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WORKSHOP PROGRAMME

Date: 15 July 2008, 13.30 – 17.00
Venue: European Parliament - Brussels - Room ASP A5G-2

13:30 Welcome and opening – Rapporteur MEP Catherine Trautmann

Part 1: The Way Forward for Fibre Regulation: Results from OECD Work

This session will explore the current status of NGA roll-out strategies in OECD countries across a range of investment and deployment scenarios and regulatory trends.

13:40 Presentation by **Claudia Sarrocco**
Policy Analyst, Information, Computer and Communications Policy Division, Organisation for Economic Co-operation and Development (OECD)

13:55 Questions and answers session

Part 2: Safeguarding Competition and Consumer Choice through Regulation

This session will outline the remaining market entry barriers that may prevent or hinder competition and will explore the various approaches that are or can be taken to stimulate NGA deployment. The crucial aim is to analyse the regulatory adjustments needed in order to preserve a level playing field for competition and to provide the right incentives for efficient investment.

14:15 Presentation by **Prof. Martin Cave**
Director, Centre for Management under Regulation, Warwick Business School

14:35 Presentation by **Prof. Dr. Dres. h.c. Arnold Picot**
Director, Institut für Information, Organisation und Management, Munich School of Management, Ludwig-Maximilians-Universität

14:55 Questions and answers session

Possible issues include:

- What are the deepest levels of effective and sustainable competition? How to balance service and infrastructure competition? What approaches should be considered for focusing regulation on enduring economic bottlenecks? How to safeguard competition in the long term?

- How is equivalence of access to be delivered across the investment chain? How to develop a reasonable system of compensation for access? What are the possible regulatory measures to facilitate the sharing of risks?
- What regulatory incentives can help push benefits of NGN to rural areas? What level of universal service obligation to impose?
- To what extent is the recommendation on relevant markets fit to cope with changes? What are the pros and cons of asymmetric vs. symmetric regulation regarding facility sharing? How is the geographical segmentation approach of market analysis and differentiating remedies within a national market going to ensure a "race to invest"?

Part 3: Regulatory Principles to Harness the Potential of NGA

The migration to NGA affords an opportunity for regulators to analyse current practices and revise them in light of the ongoing developments. The last session will examine the numerous policy challenges for regulatory authorities and policy makers that have already been raised or are expected to emerge with the advance of NGA and will identify the priority issues which should be addressed in the near future.

15:25 Presentation by **Gabrielle Gauthey**
Commisioner, ARCEP, France

15:40 Presentation by **Katarina Kämpe**
Deputy Director General, Swedish Post and Telecom Agency (PTS)

15:55 Presentation by **José Pascual González**
Member of the Board of CMT ("Comisión del Mercado de Telecomunicaciones de España")

16:10 Presentation by **Claudio Feijoo**
Information Society Unit of JRC-IPTS

- What is the role of the regulator in transitioning to and facilitating an NGA environment? What lessons could be learned by NRAs experience of NGA deployment so far?
- How to ensure transparency and debate for any planned deployment of NGA? What best practices could be identified that relate directly to the type of geographic areas where investments are promoted?
- What regulatory incentives can help push benefits of NGA to rural areas? How to encourage and facilitate public and municipal initiatives?

General Debate

16:25 Debate with all the panellists: questions and answers session

Conclusions

16:50 Closing remarks – Rapporteur MEP Catherine Trautmann

Organised by the Policy Department A and the ITRE Secretariat

SUMMARY OF THE WORKSHOP

1. PURPOSE

On 15 July 2008 the European Parliament Committee on Industry, Research and Energy (ITRE) held a Workshop on next generation access networks with the title *"Next ("Now") Generation Access (NGA): How to Adapt the Electronic Communications Framework to Foster Investment and Promote Competition for the Benefit of Consumers?"*. The purpose of the workshop was to stimulate discussion and analysis of the regulatory issues surrounding the transition towards an NGA environment and its implications on competition and investment. The workshop provided a unique opportunity for MEPs to exchange views and get independent advice from experts from academia, regulatory authorities and international organizations on how the telecom package could strike the right balance in order to foster investment in new high-capacity infrastructures and at the same time spur competition for the benefit of the consumer. The expert advice provided a better understanding for creating a forward-looking and enabling regulatory environment. In particular, the experts expressed their recommendations on the impact of ITRE's substantive amendments voted on 7 July 2008 on the future development of NGA. Unofficial consolidated versions of the Framework, Access and Authorisation Directive were sent to the experts of the workshop on 8 July 2008.

2. INTRODUCTION

The Committee met in closed session in the presence of MEPs of the ITRE Committee, MEPs Assistants and EP staff. The workshop was moderated by MEP Catherine Trautmann (Vice Chair of the ITRE Committee and Rapporteur of the EC Proposal for a Directive amending Directives 2002/21/EC on a common regulatory framework for electronic communications networks and services, 2002/19/EC on access to, and interconnection of, electronic communications networks and services, and 2002/20/EC on the authorisation of electronic communications networks and services).

The workshop began with a welcome and scene setting from **Rapporteur MEP Trautmann (PSE/F),** in which she outlined the current political debate in the context of the review of the EU regulatory framework for electronic communications networks and services as regards the issue of whether and how to regulate next generation access networks (NGA) which operators plan to roll out in the near future. With the transition towards NGA, some traditional regulatory requirements may become less relevant and obsolete, while others should be changed and adapted to the new environment. The main challenge for the members of the ITRE Committee is to establish a strong position of the European Parliament alongside with the goal to ensure flexibility and stability for all operators and better understanding by the national regulatory authorities.

The workshop was structured into three parts:

Part 1 The Way Forward for Fibre Regulation: Results from OECD Work

Part 2 Safeguarding Competition and Consumer Choice through Regulation

Part 3 Regulatory Principles to Harness the Potential of NGA

After each part, participants were given an opportunity to comment on some of the critical issues or concerns raised by the MEPs. The presentations were followed by a final debate with all participants at the end of the workshop.

This document further contains summaries of the presentations and the follow-up discussions.

3. THE WAY FORWARD FOR FIBRE REGULATION: RESULTS FROM OECD WORK

The opening address was followed by a presentation by **Ms Claudia Sarrocco (OECD)** that addressed in detail the OECD research and studies on fibre networks development and in particular their impact on competition and investment.

Firstly, **Ms Claudia Sarrocco (OECD)** briefly outlined the current situation on the broadband market, its growth, the level of competition and the deriving benefits for users. She pointed out that during the last ten years we were witnessing developments of effective competition in terms of price declines, new services, innovation, improved quality and better choice and benefits for consumers and users; but all these positive results were being challenged by characteristics of the next generation access technologies. Thus policy makers need to continue to stress the goal of ensuring effective competition on the market. In other words as the technology changes the rules have to be changed too. According to the OECD studies broadband in the OECD countries is still dominated by DSL (63%) while the cable is at 29% as not all OECD or EC countries have well developed cable TV infrastructures. Althought fibre represents only 8 % there is a clearly emerging trend to replace last-mile, copper-based connections with fibre due to the need for increased bandwidth as for instance for high-definition television (HDTV). The bandwidth needed for one HDTV television signal will be significantly higher, roughly 10 Mbit/s for each channel streamed (depending on compression techniques). Thus fibre is a small but growing technology to access broadband.

According to **Ms Claudia Sarrocco (OECD)** various technologies (wireless, hybrid and all-fibre) are available to roll out high speed first mile networks able to provide next generation services but not all technologies have the same potential for the delivery of next generation services. The current range of wireless networks is not capable of offering high bandwidth connectivity comparable to the wired networks. Because of the shared nature and of the higher prices of connectivity, these networks are used more as a complement to the wired network rather than a substitute. For that reason the extent to which future wireless networking technologies will be a competitive first mile technology is still uncertain, and is likely to vary depending on geography and population density. As regards cable, there is a possibility for 160 Mbit/s or more downstream bandwidth and using the existing infrastructure. However, the shared nature of bandwidth, both up and down, limits the bandwidth available to one user based on the use of the network by other users. The more users use the network at the same moment, the less bandwidth is available per user. In addition, the availability of upstream bandwidth is more limited than the downstream. The network is best suited to broadcast a type of applications where a large group of users watch the same channels in a linear fashion. **Ms Claudia Sarrocco (OECD)** also concluded that not all network technologies could be substitutes; often they are complementary, as it is in the case of wireless.

Furthermore, **Ms Claudia Sarrocco (OECD)** focused on the fibre networks development, its character and the impact on competition. In particular, she stressed the importance of network topology when defining the regulatory framework for NGA networks. The configuration of the networks in the roll-out of fibre has an important impact on infrastructure access and therefore on the development of an effective competition in the market. **Ms Claudia Sarrocco (OECD)** pointed out that there were different topologies for fibre networks and the way they were built influences the way they could be open to multiple service providers and local loop unbundling might not be effective under certain network configurations which could mean that incumbents might regain market power or, at best, if cable was available, a duopoly situation may emerge.

Ms Claudia Sarrocco (OECD) stressed the importance of NGA in terms of new enhanced services, boost to innovation and content creation, economic and social benefits (telework, healthcare, environment). She considered that these benefits would depend on access opportunities to fibre networks by competing service providers. She also stated that the OECD research showed that investment decisions would be very closely tied to expected penetration rates and it was quite unlikely to have infrastructure based competition as most markets would not be able to sustain more than one FTTH or VDSL operator. The OECD study on investment in fibre networks has come to the conclusion that investment is linked to penetration in the market. The monthly price depends on penetration and as the OECD research shows around 45% penetration is needed for the investment to give appropriate return and it might be difficult for facilities-based competition to emerge and thrive. The impact of penetration rate on the monthly price for an all-fibre network is such that it is unlikely that there will be multiple networks to guarantee a competitive market and it might be assumed that certain markets can have maximum two operators. Even if we factor in existing cable and PSTN based networks, it is unlikely that there will be enough room in the market place for more physical infrastructures to every household. For regulators this will mean that there is a continuing possibility of (tacit) collusion in the market. Thus, where adequate facilities-based alternatives are unlikely to develop, network architecture has important implications for access to networks and therefore for competition in the market. **Ms Claudia Sarrocco (OECD)** concluded that in addressing issues regarding competition and investment in NGA, policy makers should take into consideration the final objective: to provide users with choice of services at an affordable price. Regulators should be cautious of waiving open access requirements in return for investment in fibre as this could lead to remonopolization.

Ms Claudia Sarrocco (OECD) further stressed the importance of unbundling to ensure competition and provided some recommendations. Policy makers should ensure access to rights of way at reasonable prices, and preferably at no charge, for new entrants and incumbents as well as to provide access by new entrants to existing ducts/poles of network operators, utility companies and municipalities. Regulations to ensure the sharing of access to the inside wiring of apartment buildings and homes should also be considered. Regulators need to work with municipalities to find solutions to avoid excessive duplication of street cabinets and/or restrictions on investing in street cabinets by new entrants. At the same time municipal networks can play an important role in enhancing competition in fibre networks. Furthermore, where adequate facilities-based alternatives do not exist, it should be considered applying local loop unbundling policies to new fibre networks, in particular, sub-loop unbundling since with certain fibre configurations (FTTN) new entrants will need access to street cabinets

In stressing the importance of topology **Ms Claudia Sarrocco (OECD)** gave certain examples that can create problems for competition.

- *Fibre split close to the home of the user.* One fibre is used to pass a group of homes. At each home a separate splitter is installed to divert the signal to and from the home. This is the most fiber lean solution, but makes it hard for other operators to share the infrastructure through local loop unbundling. If the network is shared this needs to be done through wholesale broadband access.

- *Fibre split half way.* A small bundle of fibres is brought to a street cabinet. In the street cabinet the optical signal is split and from the street cabinet the connection branches out using a point to point connection where every household has its own fibre. Switching providers is as easy as switching fibres from one provider's splitter to another's, although this does require a truck roll to the splitter, introducing costs for switching.

- *Point-to-point with PON*. The network is built as a point to point network, but can be used as both a PON and P2P-network with the splitter at the local exchange. Point-to-Point fibre architecture is preferable from the perspective of regulation (easier to unbundle) and business customers (more scalable bandwidth).

As it is likely that there will be no more than one or maximum two networks in a given market, competition and consumer choice is dependent on competitors being able to access the infrastructure, in particular at the local loop. And the question is where unbundling will take place. The exchange remains the point for competitive access. Access deeper into the network, closer to users' premises, is not economically feasible for competitors, so they will not do it. Unbundling will make sense for competitors, economically speaking, only if the splice is near the exchange, as is the case for example of P2P FTTH or in case of point of aggregation. Unbundling, access to the local loop is essential, and in this context, it is also important that the price and the access conditions to the local loop are reasonable and incumbents will have a return to the monopoly they are looking for. The fear is that the dominant players will be in a better position. That is why the development of effective competition in access markets must be based on efficient (cost-based) prices, which already includes a premium for return on investment (risk). A supplementary charge for risk-sharing will distort investment decisions, possibly leading to cost-padding. New entrants paying cost-based prices reduce risks by helping to grow the market as well as compensating network owner for investment. Functional separation is important as measure of last resort, in case there is no effective competition. To sum up **Ms Claudia Sarrocco (OECD)** stressed again that policy makers in developing legislation to address the shift towards NGA should be aware of the economic and technical characteristics of different possible network topologies for the roll-out of fibre and their implications for the future development of competition in access markets. Existing regulatory tools, in particular local loop unbundling, may not be effective under certain network configurations. This means that incumbents may regain market power in local loops by investing in a specific configuration. Main demands that future users will have towards broadband networks will be seamless operation and user experience from one medium to the other, low cost and non-limiting towards future uses. Thus it is necessary to ensure operators technological choices (new infrastructure, unbundling or wholesale) in order to allow them access to the market, increasing competition, and therefore choice for users.

In her concluding remarks, **Ms Claudia Sarrocco (OECD)** provided a few points for consideration for policy makers and regulators to help creating effective competition and broadening consumer choice. As many markets will be unable to support more than one fibre rollout, regulators should guarantee access. Most OECD countries rely on unbundling, but point-to-multipoint topologies (VDSL & PON) complicate the competitive access model and may limit innovation. When governments intervene they must seek to improve competition and operate under open-access rules. Functional/structural separation needs to be an option.

Discussion: In the questions and answers session following the presentation **MEP Erika Mann (PSE/D)** raised a question as regards open access to the network and the feasibility of having a risk sharing option model. **Ms Claudia Sarrocco (OECD)** confirmed again her statement that regulators should be cautious of waiving open access requirements in return for investment in fibre as this could lead to remonopolization. Furthermore, she did not consider risk sharing as the appropriate solution to stimulate investment as it could turn into an additional cost for new entrants to get access to the networks and that a cost-best price already includes a premium for NGA investment. **Rapporteur MEP Trautmann (PSE/F)** expressed her concern as a rapporteur, in particular, as to ensuring the possibility for all operators to invest in new fibre networks.

She further stated that in her view the copper networks were not the reference for the future, and new fibre networks should be built by different investors from the beginning as different networks would ensure better competition instead of having one network with the possibility of others to connect. **MEP Pillar del Castillo (PPE-DE/ES)** raised the question of what distinguishes the development of the new fibre networks from the copper ones as regards competitive conditions and new entrants access. **Ms Claudia Sarrocco (OECD)** agreed that today we were faced with different models for investment and concluded that whoever built those networks needed to build them with open access.

4. SAFEGUARDING COMPETITION AND CONSUMER CHOICE THROUGH REGULATION

The second session outlined the remaining market entry barriers that may prevent or hinder competition and explored the various approaches that were or could be taken to stimulate NGA deployment. The crucial objective was to analyse the regulatory adjustments needed in order to preserve a level playing field for competition and to provide the right incentives for efficient investment. The two main speakers at the second session of the workshop were **Prof. Martin Cave**, the Director of the Centre for Management under Regulation at Warwick Business School and **Prof Dr. Dres. h.c. Arnold Picot,** the Director of the Institut für Information, Organisation und Management of the Munich School of Management at Ludwig-Maximilians-Universität. Each of them provided a 10-page briefing note (attached to these proceedings) three weeks after the workshop which were based on the contribution of the expert at the workshop and addressed the questions raised by the Members of Parliament during and at the end of the workshop.

The presentation of **Prof. Martin Cave** started with his view on what constitutes a NGA network, e.g. a network capable of delivering high speed broadband. A range of networks can deliver high speed broadband, through cable or others like high speed fixed wireless (Wi-Max) and high speed mobile networks (3G). What triggers NGA Investment? Apart from the demand side two considerations seem the most important: competitive rivalry and regulatory certainty. As regards the competitive benchmark, if a monopolist decides to upgrade his copper networks to fibre, the consideration will depend on calculation how much extra revenue he is going to get through selling new services; what cost savings will be taking into account the annualize capital cost of the new investment, which is likely to be very large, and the benefit of the strap value of the cooper which has increased enormously over the most few years to the point of becoming a significant item. According to him in competitive conditions the investments will be quite likely forthcoming but in non competitive conditions, to some degree the operators have to be led to make investments, they have to be offered regulatory certainty. Thus he distinguished three types of areas as far as NGA were concerned which did not match the geographic market definition: areas potentially competitive, non-competitive areas but viable (ie. there is a room for one network) and non-commercial areas (ie some kind of additional incentives have to be created). What do we do in potentially competitive areas, where current generation broadband is split 50-50 between the telco and the cable company? One solution is to adopt policy of forbearance, e.g. not to open up the networks to new competitors. How many competitors are enough to justify forbearance? As regards the regulatory options in areas without effective competition, the key point is that there is likely to be a trade off between the speed with which the NGA is built and the nature of the regulatory regime. Consideration should be given to other procedures of regulating access such as requiring certain range of services, more flexible pricing regime, etc. As regards non-commercial areas where there is little justification on ordinary commercial terms in extending NGA, there should be some kind of public subsidy.

In his concluding remarks **Prof. Cave** pointed out that there should be much more focus on infrastructure competition acknowledging that upgraded cable systems represent very important pre-existing infrastructure, and they should be taken into account. Furthermore, incentives in non competitive areas are needed in order to produce a fast rollout considering the trade off between speed and the access regime. If the access regime is the straightforward standard LRIC one, there will be difficulties with rollout and reluctance to roll out. It is also technically possible to achieve the spread in non competitive areas, but this will depend on the how much money the governments want to put in to achieve that objective.

Prof. Arnold Picot's presentation covered ten challenges facing NGA regulation: technological neutrality, access, networks neutrality, existing investments, investment uncertainty, investment sharing, ladder of investment, relevant markets, subnational markets, and universal service. In his view, the regulatory measures for NGA have to be designed independently of a particular type of technology as it is the situation today. With the advent of NGA, regulation has to strike an adjusted balance between ensuring efficient access and promoting competitive investment. Depending on the type of topology the competitive situation changes quite dramatically and depending on the kind of access, bottlenecks will appear or disappear. The high roll out cost for replication of infrastructure leaves less room for competing infrastructures. Consequently, it is very difficult to come up with one size fits all solution. Due to consumer switching costs network neutrality is of major importance; deviation from neutral handling of data must be made transparent from the outset. QoS should not have a negative impact on other services except explicitly requested by the customer. **Prof. Arnold Picot** pointed out that several NGA deployments were currently being rolled out by private investors without being influenced or enabled by regulatory support, (e.g. voluntary investments). Thus regulators should take into account the investments already in place, otherwise voluntary investment will decrease. The new regulatory framework should consider these investments in place and regulatory support should be in areas where competitive investment does not work efficiently. New infrastructure investments require orientation about future regulatory conditions (e.g. regulatory certainty). Reducing uncertainty can be done in two ways: through passive measures which means information should be provided especially in order to ensure transparency of incumbents' plans for NGN/NGA rollout to avoid stranded investments, and through active measures. There are two ways to share investments: one is to invest jointly and then to have some rules to manage this and the other is to use it jointly. Joint investment can be done voluntary or enforced by a regulator. So far we have only the voluntary joint investment in Europe and we are switching perhaps to mandatory joint investment which in the point of view of **Prof. Picot** is very risky. A question remaining open is about what should happen if there are two players which invest jointly and there comes a third or forth player which want to get access? Furthermore, to what extend shared investment might lead to collusive and potential anti competitive behavior? **Prof. Picot** also pointed out that the application of traditional Investment Ladder Approach would not work on new infrastructure not deployed yet and setting long term regulatory conditions from the beginning would provide safe environment for investments. He also considers that the regulatory measures for markets 4 and 5 are to be enforced in an NGA environment, if consistency with existing definition and SMP can be proven. For NGA different subnational regulatory regimes are required to cope with differences in metropolitan and rural areas. In rural areas there is a tendency toward ex ante regulation and in metropolitan areas towards ex post regulation. Universal Service obligation is to be updated according to market conditions and could be used as additional measure for provisioning of NGA to rural areas.

Upgrading existing Universal Service definition using the German Universal Service approach according to current broadband could result in private incentives to invest. Finally, **Prof. Picot** concluded that besides all granular regulatory approaches, interdependencies between and among regulatory measures should not be neglected.

Discussion: After the presentations **Rapporteur MEP Trautmann (PSE/F)** opened the floor for questions to the speakers. She pointed out that the main point of her report was to establish regulatory certainty for operators. As regards the issue of remedies, she considered that they should be defined by national regulatory authorities before the investments were made, and not imposed after that. The task of the regulator is not the same before and after the decision to invest in new fibre networks as the companies need to combine short- and long-term decisions; decisions to invest in new networks need a long term vision and it is very important that operators have regulatory certainty. She stressed that the main goal of the proposed amendments was to ensure that the investments could be made and that the NRAs could have some tools to provide the incentives and obtain more transparency. If operators can foresee their return of investment they can invest in an area wider than initially considered as the main aim is to boost competition not only in urban areas. **Prof. Cave** indicated that he was generally in favour of a permissive approach to risk sharing but he stressed that a mandatory approach might cause too much conflict within the organization. Thus according to him regulators should encourage risk sharing arrangements but they should not mandate them. With risk sharing arrangements the problem of identifying discrimination becomes more difficult. In his opinion the regulatory commitment by NRAs should be more than the present-day three-year period and should be followed by some kind of general statement about the approach of the regulator, or indeed at European level through the framework directive, to provide additional certainty and incentives to operators. **Prof. Picot** mentioned that research had showed that in order for an investment to be profitable 40-50% of the market should be covered, which could lead to an SMP world and obligations imposed by regulators. For rural underserved areas he suggested public subsidies or similar public intervention which could create conditions which would make the investment profitable in the long term. If the investor can be assured certain market share over a period of time and charged an access price that reflects the market penetration, he will invest. At the same time the investors could differentiate prices according to durations committed, but it is very difficult to come up with thresholds.

To the question of **Rapporteur MEP Trautmann (PSE/F)** whether there was a need for a harmonized method for the calculation of the risk, **Prof. Cave** responded that this could be avoided by delegating the decision to the firm for a period in the hope that in many cases it would be in the interest of the firm to "fill up the pipes" if they build up a NGA. The analytical difficulty is the method which people use to calculate the cost of capital and the risk element associated with it, which is mainly focusing only on systematic risk, which depends on the ups and downs of the economy. But the NGA discussion is more about specific risks, demand risk and execution risks which vary considerably between one member state to another and it is very hard to achieve such standardisation. **Prof. Picot** also confirmed that full harmonization was very difficult but the new proposed regulatory body could prevent big differences between countries.

MEP Erika Mann (PSE/D) asked a question of how many access networks were needed in order to justify the removal of ex-ante regulation and whether two networks were enough. According to **Prof. Cave** the regulators ought to consider whether two is enough even when those two may decide not to offer access to number 3-4-5. In areas where there is cable and there is no single dominance, the question arises whether there is a reasonable expectation for a collective dominance. And the answer should be different on a case by case basis.

He gave the example of Malta where the European Commission decided that the cable network, the telco and the possibility of wireless created effective competition. **Prof. Picot** disagreed stating that US was falling behind in terms of broadband diffusion because of the duopoly situation which was not a real competitive situation. Therefore it is necessary that even if the access networks are only two they should be left open subject to access obligations. **Rapporteur MEP Trautmann (PSE/F)** emphasized that a duopoly was not a solution. More than one or two networks are needed, with an open access immediately. Small companies should be given the possibility to expand their business across different countries and not only the incumbents. As regards the time frame, she supported the idea of a revision clause to ensure continuity and predictability of the regulation. **MEP Erika Mann (PSE/D)** was also interested in the opinion of the speakers as regards the freeing up of spectrum. **Prof. Cave** supported the view for liberalizing spectrum, allowing much spectrum to be based to a change of ownership, pointing out that spectrum markets were not national markets but in fact geographical markets and spectrum in rural areas was not particularly valuable until used. **Prof. Picot** also agreed that the digital dividend should be used for broadband applications and should be freed as early as possible.

5. REGULATORY PRINCIPLES TO HARNESS THE POTENTIAL OF NGA

The last session examined the numerous policy challenges for the national regulatory authorities and policy makers that had already been raised or were expected to emerge with the advance of NGA and identified the priority issues which should be addressed in the near future. The session started with a presentation entitled "Regulation of NGA" by **Ms Gabrielle Gauthey** in which she presented the view of the French Telecommunications and Posts Regulator (ARCEP). She started her presentation by pointing out that the state of play of NGA deployment in France required some anticipatory rules before the new framework for electronic communications, considering France's head start in deploying fibre to the home and the different situation in every country. She further outlined the market situation in France. France is a one-platform country, cable is only 5 % of the broadband market and competition has taken place through local loop unbundling. She stressed that France had a very rather competitive "triple-play" market in the areas where there was unbundling which was due to couple of factors – the dynamics of France telecom, regulation, successful unbundling with bitstream as geographical complement, and municipal intervention which did not take the place of regulators but which helped to expand competition in the country by rolling out dark fibre networks open to all operators. Geographical markets in France are very difficult to define as in one department 80% of the market is unbundled which means has triple play while in a neighbouring department it is only 20%. So there is a geographical gap between departments which have taken initiatives and those which have not.

The major players in France have announced fibre deployments, mainly FTTH because of the topology of the incumbent. The investments are significant and have to be spread across several years. The major concern for ARCEP is to tackle the bottlenecks and to ensure that this investment is borne by all operators as much as possible even in the essential part of the local loop. The overall aim is both to provide incentives for investment and to facilitate as many operators as possible to take part in the roll out, even if not on a level playing field. In this respect, **Ms Gabrielle Gauthey (ARCEP)** pointed out that alternative operators required access to civil engineering as for an operator deploying a very high bandwidth network access to existing civil engineering changes the economic equation considerably because sometimes it accounts for up to 80% of the costs. France Telecom's ducts are an essential infrastructure and ARCEP has audited France Telecom's ducts in several cities. The audit has shown that civil engineering is available although availability is heterogeneous and will depend on engineering rules, in particular for desaturation.

In its market analysis on broadband which has been notified to the European Commission, ARCEP has proposed to regulate the access to France Telecom's ducts. France Telecom has communicated its ducts offer to the operators. Thus ARCEP will ensure that all operators have access quickly to civil works under equivalent conditions, in particular, it will require operators to provide an equivalent information on the availability of space; to use appropriate engineering rules that optimize the available space and the use of the ducts; to have a transparent, non discriminatory, cost oriented access to the ducts and to share part of the capital costs by coordinating work.

One of the main issues of concern for ARCEP will be access to buildings and sharing the last part of the local loop as fibre deployment to the home means that private properties have to be equipped. Operators are prepared to bear the cost of this installation in the centers of major cities. However, condominium owners, landlords and building managers fear that monopolies will be created by building or neighbourhood and they want to limit the number of agents in common areas but at the same time to be able to choose their operator. That is why sharing among operators is necessary and there is a common agreement that the first operator which installs the fibre in the building will give other operators access to its network. But in practice, operators in France have not yet applied sharing. As the current framework does not include sharing some innovative and anticipatory measures should be taken. The law which is under debate at the French Parliament will extend "symmetrical" regulation currently limited to interconnection, to cover obligation applicable to all operators and gives the responsibility to ARCEP to define clear means of sharing and to guarantee that operators respect them. ARCEP considers that sharing of in-house wiring at the level of the building and access to ducts alone will not be sufficient to guarantee sustainable competition, even in dense areas, as it is doubtful that there will be several rollouts until the base of each building on all the territory. Thus, the first operator rolling out fibre in an area will have to allow sharing, at some point higher in its network, which has to be chosen carefully, as it will determine the topology of the network for the following ones. ARCEP has put under public consultation these issues with the goal to anticipate the "symmetrical" regulation framework and to have the point of sharing not inside the building, which is urgent because the incumbent wants the sharing to be at the bottom of each building.

In conclusion, **Gabrielle Gauthey (ARCEP)** pointed out that ARCEP considered that two regulatory tools were needed: regulation of the ducts inherited from the former public monopoly, which would concern France Telecom ("asymmetrical" regulation) and sharing of the last part of the fibre networks, which would concern all operators ("symmetrical" regulation). The main goal is to find a good balance between encouraging investments and preventing the creation of local monopolies considering the need to accommodate different physical topologies from different operators and the France Telecom's dominant position on the civil engineering and not on the local fibre loop. Finally, **Gabrielle Gauthey (ARCEP)** considered that the role of municipalities is as crucial as the role of NRAs in providing local information, coordinating work, laying remaining ducts and authorising lightweight civil engineering, authorising wiring on facades and encouraging pre-wiring in new buildings and major renovations, avoiding duplicating of infrastructure, ducts, even fibre which can be shared among operators using different means, etc.

The presentation of **Ms Gabrielle Gauthey (ARCEP)** was followed by a presentation entitled "The NGA challenge – a regulator's view" by **Ms Katarina Kämpe** in her capacity as a Deputy Director General of the Swedish Post and Telecom Agency (PTS). In her view, NGA is both a possibility and a challenge and part of the challenge is to try to create an environment with neutral incentives for investments in different technologies.

Her presentation started with a brief overview of the broadband market in her home country Sweden which was, as **Rapporteur MEP Trautmann (PSE/F)** pointed out, very interesting in terms of the decisions taken, geographic specificity and low population density. In Sweden xDSL network reach almost every household in Sweden with 55% of penetration. Cable TV networks reach about 60% of the population and fibre to the building/home - around 30% - often in parallel with cable TV networks. Mobile Internet is growing very fast from 4% to 12%. A roll-out of fibre in the access network, closer to the end-user, is on its way, predominantly through VDSL2 services. Telia Sonera, the network operator, has announced that 2 million households will be able to access services with a capacity between 30 and 100 Mbit per second in five years. According to **Ms Katarina Kämpe (PTS)** the US model with two parallel infrastructures is not enough to achieve competition and a long term sustainable competition situation could be reached when three or four parallel infrastructures compete. The experience from the Swedish mobile sector indicates that four parallel infrastructures are needed to achieve competition in a growing market with high customer demand. She further stated that if the customers continue to demand higher capacity, fibre would be a key to meet this demand. But the current European regime, promoting parallel infrastructure will be challenged. The unbundling of local loops, seen today as a natural step between service-based broadband competition and establishing parallel infrastructure, may lose its importance. She considered that there would not be parallel fibre infrastructure in the access network all the way to the end-user, especially in rural areas. The investments in fibre require high density of customers, and the major part of the investment lies in ducts and civil works. So her conclusion was that promoting competition through parallel infrastructure would not be the way forward in a world where fibre infrastructure was needed to satisfy the demands of capacity and in this context, regulation of open access networks and bitstream in small and large access networks would be necessary for competition to flourish. Furthermore, **Ms Katarina Kämpe (PTS)** pointed out that the current proposals, with a technology neutral approach, gave a very positive signal to the market and the regulatory bodies. She considers that the framework must give the tools to provide competition in both scenarios – the current approach with parallel infrastructure based on different technologies and the fibre scenario, with the proposal of a technology neutral functional separation of SMP operators being a big step in the right direction. The framework must also provide neutral incentives for investment in different technologies, while competitors need clarity about what will happen with made investments in local loop unbundling (LLU) and under which conditions new LLU investments are to be made. Competitors need information about planned NGA investments, to be able to build their own business cases and make investment decisions. Municipality-owned networks and networks financed fully or partly by state subsidies need to be truly open. Ducts for fibre are and will be a valuable resource that may need stronger access regulation. The possibility to use municipality-owned ducts for energy or water, not only ducts owned by telecom operators, must be looked at more closely. Obstacles for commercial investments, such as rights of way, must be removed – here the municipalities again are the key stakeholders.

Later in her presentation she pointed out that wireless access would be vital in the future in Sweden considering that the copper access network in some parts of Sweden would be de-mounted over the next few years, and replaced with fixed-mobile technology which would affect about 50 000 households. A more liberalised spectrum management, as suggested in the framework review, will release the full potential of wireless solutions. The digital dividend spectrum, frequencies that can be used for services with good coverage, is well suited to bring electronic communications with good capacity to people, even in sparsely populated areas.

Although a commercial rollout of NGA in rural Sweden is not to be expected in the foreseeable future, the state and the national regulator have an important task in dealing with access to electronic communications in rural areas. State subsidies, as suggested in Sweden, and a modern and technology neutral approach to the universal service obligation will be vital to prevent a digital divide. Wireless, copper-based and fibre networks will be needed. Access regulation for better competition and the ambition of giving everybody the opportunity to take part in the information society must be seen as two equally important sides of the same coin.

In her concluding remarks **Ms Katarina Kämpe (PTS)** stated that for an operator considering whether or not to invest in NGA, the overall message from the EU must be clear. She supported a transparent EU regulation that should balance the need of access regulation with the conditions to invest in NGA. In this respect, offering "regulatory holidays" to "protect" NGA investments is not a solution. Access regulation will be necessary, also when the SMP operator chooses to invest in NGA, as an NGA roll-out not necessarily makes the SMP operator less dominant. Perhaps the incentives for investments in NGA should be stronger in future price regulation models? Price regulation imposed on SMP operator may have to reflect a higher business risk connected with a NGA roll-out. Due to the apparent advantage of being the first mover to NGA, the incumbent´s advantage in relation to its competitors regarding information must be addressed. Strong transparency and non-discrimination obligations are crucial to prevent what could be called "a false start" from the incumbent. The network operator must be open about its plans for NGA, to make it possible for competitors to evaluate business cases and their possibilities to invest; functional separation may be a necessary remedy in this respect.

Following the presentation of **Ms Katarina Kämpe** (PTS), **Mr José P. González Rodríguez** presented the view of the Spanish Telecommunications Market Commission (Comisión del Mercado de las Telecomunicaciones (CMT)). His presentation "Regulation on a NGAN Environment" started with a detail explanation of the development of the Spanish broadband market. In Spain around 40.5% of the total income in the telecom sector comes from mobile services and around 23.9% from fixed telephony. In his view in the coming years 60% of the market would be captured by mobile services both voice and broadband. In the fixed telephony 44% of the income comes from access. The tendency is towards increasing fixed-mobile substitution. Although the mobile services are more expensive people prefer to use mobile instead of fixed telephony. Telefonica has a market share of around 56% in the broadband market. Cable broadband market share changes from 52% in some regions to practically 0% in others, normally it is around 40%. At the same time the local loop is a second preferred option after the cable. Only in regions where there is no cable people will buy local loop. Bitstream comes as an option where there is no cable and no local loop. Telefonica market share ranges from 32% to 78% in the different regions depending on the cable operator development. Thus he concluded that in the broadband market first was cable, second was Telefonica, a third solution was local loop and bitstream was the last option selected by the market. Cable competition is the principal reason for Telefónica optical fibre development.

In his view there is a need for a regulatory balance between competition protection (but not protection of competitors) and investments promotion in order to increase consumer welfare. In order to achieve these goals market analysis and remedies should consider the classical tools as well as new ones considering the situation of the market, in particular, the availability of copper based legacy infrastructures**,** the underlying passive infrastructure (ducts, manholes, etc.), the dependencies between retail and wholesale markets.

Furthermore, the geographical dimension of the market should be considered taken into account that Spain is a low density country and the differences existing between densely populated areas and areas where only the incumbent is present. Although the development of cable and LLU is not completely homogenous it is obvious that different geographical scenarios may be identified which implies the application of different remedies according to the area. **Mr José P. González Rodríguez (CMT)** further provided more data about the Spanish market. A relatively low number of local exchanges (600) reach coverage of above 60% of the total number of local loops. The size of a local exchange is one of the drivers for LLU operators' investment decision, resulting into a positive correlation with respect to LLU operators' market share. Cable operators in Spain are real telecom companies. They have started development their network in 1998-99 and have installed around 8 million access lines. Telefonica has installed around 16 million access lines. The difference is the number of access lines in service. Cable and LLU development is quite similar except for Madrid and Barcelona where cable has failed, but LLU is always the third option. The overlap between cable, LLU and Telefonica's presence results into a relevant degree of potential or real infrastructure competition in around 70% of households. CMT guidelines on NGAN remedies identify two areas - competitive and non-competitive. The regulation of the copper is going to be maintained. In a competitive area it will be up to the market to decide when copper networks should be replaced. As it is in France ducts and other passive infrastructure will be opened to new competitors but only under a sample agreement, giving the opportunity for negotiations on commercial basis. FTTH bitstream access is not going to be offered in competitive areas but will be regulated with possible "sunset clause". He further outlined that the most important problem, the real bottleneck, was the indoor cabling. Ideally the first operator present should be obliged to lease its indoor infrastructure. In the meantime CMT has considered temporal solutions considering that the incumbent Telefonica has already started the development of their own network and the importance of allowing third operators to plan in advance the deployment of investment strategies. Thus, two main obligations are imposed to Telefonica that will be in force until CMT completes the definition of markets 4 and 5: an obligation to provide access to infrastructures in the public domain (ducts, manholes, etc.) and an obligation to provide FTTH virtual access in NGAN conveyance nodes.

The last presentation at the workshop "Next Generation Access - Policy challenges and priority issues" was by **Mr Claudio Feijoo** from the Information Society Unit of the Institute for Prospective Technological Studies of the JRC of the European Commission. In his presentation he focused on the future vision for the development of NGA networks in the next 5 to 10 years. He identified a couple of different scenarios: from one side the fibre deployment (FTTH) and on the other side some kind of a 4G network which needs a lot of spectrum (for example mesh technologies, where the role of fibre is reduced) with some form of converged networks and technologies in the middle. He pointed out that fibre would be important in the future but would not probably play the main role. He stressed that the availability and deployment of techno-economic NGA solutions depended more on the internal dynamics of supply (cost efficiencies, etc.) and the evolution of the demand. In this respect the existence as such of NGA does not depend on regulation. The main influence is the pace of NGA deployment, the rhythm of investment. He further pointed out that from an infrastructure perspective the two main issues were fibre deployment investment/competition conditions and spectrum management. But the problem lies with the fact that the rapid techno-economic evolution avoids picking “winners”. He gave UMTS as an example of the danger in picking "winners" at an early stage. In his view product differentiation is the base for competition. He noted that operators had slowly started to invest in NGA but fibre (FFTH) roll-out was delayed in the EU with regard to the main rivals USA, Japan and Korea.

At the same time there are credible roadmaps for 4G rollout from 2010-2011 onward and in this respect EU is ahead of US. **Mr Claudio Feijoo (IPTS)** also forecasted that from 2010-2011 onward there would more mobile broadband connections than fixed ones. On the other side operators maintain their doubts whether the applications and services offered over a NGN can provide a sufficient return on investment and, at present, they are not sure which killer application, if any, will provide new revenues stream. As a summary he concluded that NGA deployment would take place, but its pace would depend tremendously on a number of factors:

- the departure point of the operator - which is different for every operator and every member states;

- the existence of business models beyond mere connectivity;

- the competitive regulatory framework.

Furthermore **Mr Claudio Feijoo (IPTS)** focused on the geographical dimension of NGAs and identified three areas with three different levels of competition.

1. Areas type A (high density urban - urban - suburban): Competition “level-3” (fixed + cable + broadband mobile + others) to “level-2” (fixed + broadband mobile);

2. Areas type B (suburban - rural): Competition “level-1.5” (fixed + mobile);

3. Areas type C (rural – remote rural): Competition “level-1” (fixed universal service/mobile) to “level-0” (nothing).

Mr Claudio Feijoo (IPTS) further developed his vision of the future levels of competition:

- Level-3 - withdrawal of ex-ante regulation for NGA but with attention to providing spectrum for more operators and avoiding natural oligopolies;

- Level-2 - ex-ante regulation for NGA/broadband access to become level-3 as basically only the fixed operator (the incumbent typically) exists and the mobile operator only providing modest broadband, so tools such as rights of way, ducts, even functional separation could be considered although not in the mid term and not in mixed geographical areas;

- Level-1.5 - key role of spectrum management to become level-2 in order to ensure competition as much as possible;

- Level-1 and Level-0 - new universal policy tools are needed especially as related to universal service objectives. These new policy tools (e.g., public-private partnerships) require evolution of the policy tools from supply to demand and from strong regulation to market-light touch with a high degree of coordination among them.

He summarized that a coordinated policy approach encompassing a larger array of policy initiatives (at least both supply side and demand side oriented) would have a greater chance of success than just a single policy tool.

In his concluding remarks **Mr Claudio Feijoo (IPTS)** reminded that NGA was very important but only as a part of complex system. There is an important role for regulation to move from the infrastructure based approach to the edges, closer to other types of infrastructure such as mobile assets, closer to the users. He also summarized the main regulatory trends and matched them against what was being proposed in the ITRE amendments and concluded that the new electronic communications framework would not be the ultimate framework, but the last with main focus on infrastructures although some form of infrastructure regulation would subsist in the future. He evaluated the proposed framework against existing and new trends.

As regards existing trends such as less regulation, transition from retail to wholesale and transition from ex-ante to ex-post regulation and the convergence of the proposed framework has fulfilled its objectives. In view of the new trends he recommended improvement in the area of regulation of services not technologies and targeted policy actions and new tools. He also identified consumer safeguards as a main area for future development. Issues on vertical integration and media concentration will also regain importance.

6. CONCLUDING REMARKS

Rapporteur MEP Trautmann (PSE/F) stressed the importance of having a common approach to spectrum as the development of fibre networks was parallel to the discussion on spectrum. She asked the speakers to provide written contributions as regards the future approach that should be adopted and the priority areas for policy regulation that should be identified.

BRIEFING NOTE

by Prof. Martin Cave,University of Warwick

EXECUTIVE SUMMARY

Regulating NGAs is probably the major problem facing European telecommunications regulators. Unlike copper access networks which have been in existence for decades, across most of the EU operators have yet to sink the major investment in NGAs. The regulatory problem is one of eliciting the investment to build the networks and of pricing the use of them appropriately.

NGAs are most simply defined as access networks capable of delivering high speed broadband. This technologically neutral definition allows the inclusion of upgraded versions of the cable networks which pass about 30% of EU homes. It may also include the next generation of wireless networks, although their performance is less reliable in view of the high level of shared use they entail.

It would be possible, but mistaken, to suppose that NGAs will lead to a remonopolisation of access networks in currently competitive (ie cabled) areas. Instead, regulators should, wherever possible, try to provoke investment races among NGA suppliers. If two or more operators have networks, the wholesale access market may be effectively competitive. In this case, access regulation cannot be imposed. Even if there is a dominant firm, it may still be desirable to encourage investment by others by less rigorous cost-based forms of regulation than have been applied to copper networks.

Where there is likely to be room only for one NGA in a geographical area, it may be desirable to ensure that access to that network by competitors is available on terms which give an adequate incentive for the operator to bring forward the construction of the NGA.

In both cases, the regulator should seek to exploit opportunities for access seekers to from long-term risk-sharing contracts with network owners. Competitive pressure from wireless networks should also be applied to the maximum by a flexible spectrum management policy.

In summary, NGAs require a different and more flexible form of regulation than has been used with the copper network, which combines incentives to invest as well as procedures to encourage efficient use.

1. APPROACHES TO REGULATING NGAs

My focus will be on next generation access (NGA) networks, since next generation core networks generally act to increase competitors' ability to compete.

I suggest that there is a hierarchy of questions concerning the future development of the access markets which has to be considered in each separate group of geographical markets where the conditions of competition differ considerably from those in other groups.

Of course, it would be possible to jump over this process and conclude that the outcome will be a fibre monopoly everywhere, augmented by a number of wireless options. If such a policy is adopted, or even if such a forecast is made, it is highly likely that the accompanying regulation will make it self-fulfilling. This reflects the fundamental truth that, just as regulation reacts to market structure, so market structure reacts to regulation. In other words, opening up a network is likely to deter competitive investment.

This point has been elaborated in a recent paper which investigates the relationship between access regulation and investment on the basis of data covering a panel of 180 European telecommunications firms over 10 years, (Friederiszick *et al* 2008). It concludes that stronger access regulation has little effect on incumbents' investment but reduces significantly that of entrants.

The opportunity cost of accepting the inevitability of NGA monopoly is the chance to establish high levels of infrastructure competition, at least in some geographies. How high is this? It is obviously the product of the possibility that competition will emerge, and the value of it if it emerges. Both of these are hard to establish. However, I will assume for the purposes of the analyses this follows that both magnitudes are large enough to make the exercise worthwhile.

Accordingly I distinguish three different geographic areas - those which are:

- potentially competitive
- probably monopolistic, but where NGA investment can be made commercially justified
- non-commercial.

These will then be linked to three types of regulatory approach:

- forbearance from access regulation
- mandatory access to a singly dominant NGA
- mandatory access to one or more collectively dominant NGAs in a geographical market

In this paper, I confine my discussion to areas where at least one NGA is commercially viable. In non-commercial areas, NGAs can still be built, but some form of subsidy is required. I note that in sparsely populated areas, wireless technologies may be the appropriate for delivering higher speed broadband.

2. COMPETITION ENVIRONMENTS FOR NGAs

The discussion must hinge on 'what is an NGA'. For simplicity, I will define it as an access technology which can support high speed broadband, say at 40-50 Mbps download speed. This would have to be an expected speed, or one achieved at least 50% of the time. Assimilating mobile broadband into such comparisons is particularly difficult, because the whole network down to the device is shared amongst users, and actual speeds can vary considerably.

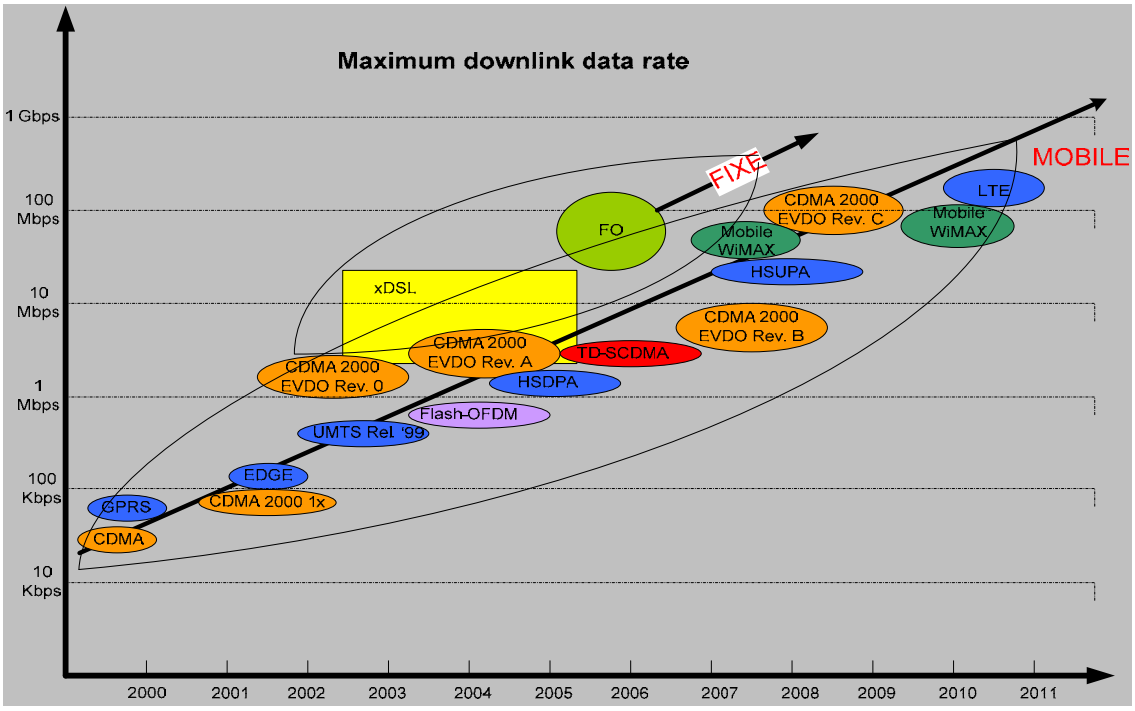
On this footing, the universe of NGAs might include:

- fibre to the home/premises networks (FTTH/FTTP)
- fibre to the cabin/node networks (FTTC/FTTN)
- upgraded cable networks (for example, using the DOCSIS 3.0 standard)
- fixed wireless networks (using e.g. fixed WiMax)
- mobile wireless networks (3G, LTE, mobile WiMax etc.)

Figure 1 contains a projection of speeds up to 2011. This projection introduces the following assumptions:

- fixed networks are on an order of magnitude (10x) greater than mobile ones.
- mobile speeds lag fixed ones by 3-4 years;
- 1 Gbps is quite practicable with a fixed network (e.g. the Singapore high speed broadband currently being tendered is based on upgrading all premises to 1Gbps)
- mobile speeds in excess of 100 Mbps are projected from 2009, when the first LTE networks are projected to come into service.

Figure 1: Maximum downlink data rates of various technologies



Source: IDATE (2007)

If we take a time horizon of 2012, it might seem appropriate to treat mobile networks as part of what are currently conceived as NGAs. We must recognise however, that though wireless technologies will soon achieve the 2008 version of high speed broadband, they are likely still to lag behind fixed technologies. On this basis it may be preferable to see them as a competitive constraint on fixed networks, even if they are not formally found to be in the same market.

In many member states, a significant subset of households (amounting to perhaps 30% of households in the EU as a whole) has exposure to upgraded cable–TV and DSL technologies. A very much smaller proportion has access to competing fibre-based suppliers.

As a rough generalisation based on European experience, competitive dynamics in some areas appear to lead to a race to roll out NGAs. In other areas, including those which lack a cable or other infrastructure-based competitor using an earlier technology than fibre, roll-out is slower or non-existent.

Underlying this is a key difference in the application of net present value methods to appraise investment in monopoly and competitive environments. In a monopoly, replacement of an existing technology is governed by the condition that the total additional costs (fixed and variable) of the new technology must be less than the sum of the variable cost of the old technology and incremental revenues which the new technology brings.[1] If this condition is not fulfilled, the monopolist may well choose to 'sweat the existing assets'. In relation to the replacement of copper – by fibre in an access network, this formula can be expressed as:

Annualised costs if fibre < operating cost of copper + incremental revenue from fibre.

In a competitive market, the right hand side of this relationship is augmented by two more terms: revenue gained from competitors as a result of the investment + revenue protected from competitors by the investment.

As an illustration, KPN in the Netherlands was losing a significant percentage of subscribers annually to cable companies, until it became the first incumbent in the EU to install an NGA with a wide area coverage.

2.1 Policies for Competitive NGA Areas.

In areas where an investment race is in process or could be stimulated, what regulatory policies are available? The answer to this question is, of course, dependent upon geographical market definition. A national market definition is first more likely to produce a dominant operator than a geographical market confined to competitive areas.[2] In a latter case single firm dominance may or may not be found. If it is not (and if the stringent conditions for a finding of collective dominance are not satisfied) then regulation will not be permissible.

Where competition between infrastructures is not effective, the choice of regulatory remedy involves trade off between the objectives of service and infrastructure competition, and between short-term and long-term benefits to end users.

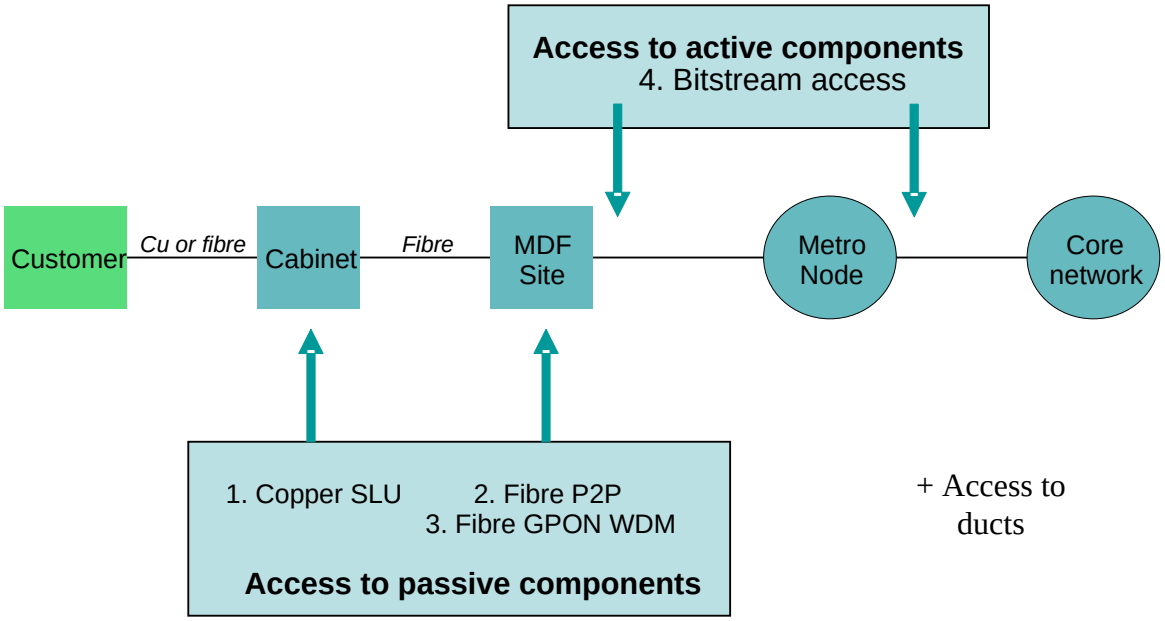
I can see no reason to suppose that the results of Friederiszick *et al* (2008), referred to in Chapter 1 above, relating to earlier periods will not apply as a factor in the case of NGAs. In other words, imposing rigorous forms of access on the first fibre network to be built is likely to discourage investment.

Moreover, it is well known that NGAs permit more limited access than current generation networks. The options are shown in Figure 2.

[1] The additional cost of a fibre network is of course, substantially reduced where an operator inherits physical assets and customers from a pre-existing copper network.

[2] Of course, if different operators are dominant in different geographical areas, the number of individual geographical markets grows correspondingly.

Figure 2: Points of Access to NGA networks



Source: Unpublished joint work by the author.

Subloop unbundling is only applicable for FTTC technologies; it may be technically difficult, and unbundlers face the commercial challenge of recovering their costs from a pool of potential customers served by a cabinet, which is much smaller than that available at a local exchange, where local loops are unbundled. The major alternative – bitstream – can be devised to permit a degree of service differentiation.

In my opinion in actually or potentially competitive areas, the NRA should consider a range of possible regulatory responses, being mindful of the desirability of promoting end-to-end infrastructure competition. In decreasing order of severity, these are:

- no imposition of mandatory access. If applied to all technologies this would cut off from supply at regulated prices those operators currently unbundling loops in the relevant areas;
- restricting mandatory access to fibre to specified wholesale products, for example, those capable of speeds currently available using DSL technologies. This would give the installer of fibre exclusive access to higher speeds, unless it agreed commercial terms with access seekers. This is known in the UK as 'anchor product' regulation – one of it consequences it to protect existing customers of unbundlers from any inevitable disturbance of their service as fibre replaces copper;
- imposing mandatory access obligations, but at reasonable prices, imposed under Article 12 of the Access Directive rather than cost-based prices imposed under Article 13;
- incorporating a risk-related element in the cost of capital when settling access prices, this approach is apparently favoured by Commissioner Reding;[3]
- application of the normal approach to cost-oriented pricing at the standard cost of capital.

[3] Reding (2008). The Commissioner personally favours a risk premium around 15% (p.7).

If we interpret the paper by Friederiszick *et al* (2008), noted in Chapter 1 above, as implying that a generous access regime will diminish second mover's incentives to invest, this creates a basis for considering some of the variants at the top of this list.

The argument for doing so becomes stronger the greater the competitive constraint wireless technologies represent. As noted above, this depends upon whether we focus on projected levels of wireless functionality (which will grow) or on the gap between fibre and wireless, which may well be maintained.

2.2 Regulating a Monopoly NGA

It is almost inevitable that many parts of member states will be served by a single wireline NGA. Their extent may diminish over time, but the population served will still be significant. What regulatory regime will promote the replacement of copper with fibre where it is viable?

The problem here is that, absent competitive pressure, operators may choose to delay the installation of fibre even when a fibre network has a positive expected net present value as compared with maintaining the copper network in place. This is because delaying the fibre until uncertainties are removed has an option value to the investor from which it has to be bought out by higher returns.

The access regime has two effects on an access provider's profit - a low access price restricts its revenues directly, and it puts a squeeze on retail prices generally, as competitors buying access products from the incumbent bring down retail prices. On the other hand, the evidence from the study cited above is that in the past in Europe the access regime has not affected incumbents' investment levels.

There is thus an apparent conflict between the *a priori* proportion that a tough (eg a cost-based) approach to pricing mandated access will harm investment, and the European empirical evidence. Placing greater emphasis on the latter would encourage NRAs to adopt a cost-based approach with fibre. Placing faith in the former would lead them to offer incentives for investment in the form of departures from traditional cost-based access pricing of the kind listed in the previous section.

Finally, the construction of an NGA in a monopoly area – as in a more competitive one – can be encouraged by giving the access provider and potential access seekers the right to construct a risk-sharing contract. This might take the form of co-investment (like the proposal by eight operators in Australia to build a national NGA), but such plans may founder on disagreements. More plausibly, an access seeker might enter into a long-term contract with an access provider for a quantity of access services on a 'take or pay' basis. Such an access seeker would expect to benefit from a quantity discount or an adjustment to the price to take account of its assumption of some investment risk. Unregulated arrangements of this kind are fairly commonplace in other sectors. But they impose a challenge for a regulator to establish if they are discriminatory – i.e. to verify that the prices and quantities contract market and in the spot market do not advantage one or other class of purchasers.

3. CONCLUSIONS AND RECOMMENDATIONS

Two issues have been considered here:

- do NGAs lead to remonopolisation?
- how should they be regulated?

In my opinion, while there is a chance of remonopolisation in currently competitive areas, regulation can reduce that chance, just as it could, conversely, enhance it. It would be defeatist and counter productive to abandon hope of competition already.

The options in potentially competitive areas hinge on whether infrastructure investment leads to effective competition in unbundled (sub-) loops and in wholesale broadband access. This in its turn depends upon whether a separate geographical market definition is adopted for competitive areas. If there is effective competition, regulators may not intervene.

Where intervention is legal, I have suggested certain ways applicable in both competitive and non-competitive areas, in which current cost-based access remedies can be flexed to create greater freedom of competitive response in competitive areas and greater incentives to invest in monopoly areas. These include, in both cases, long term contracts between access sector and access provider. If they want one or more NGAs to be built, then these should be considered.

Finally, the most obvious policy is to ensure through spectrum liberalisation that the wireless broadband challenge is as strong as possible.

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BRIEFING NOTE

Prof. Dr. Dres. h.c. Arnold Picot, Ludwig-Maximilians-Universität München

1. INTRODUCTION

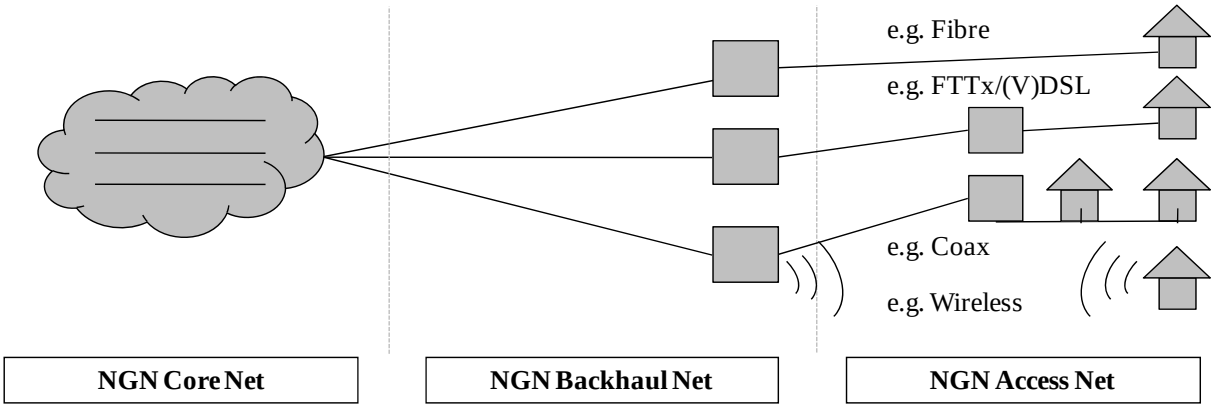
Next Generation Access (NGA) denotes the technical and economic conditions that will shape future access to high performance broadband internet. This issue is of utmost societal, economic and political importance since demand and supply of all kinds of information and communication resources will increasingly depend on one's ability to have access to local, regional, national and global infrastructures and services for electronic communications and therefore deserves an intense public policy attention (Picot, A. and Wernick, C).

Next Generation Network (NGN) is a concept describing a new architecture for electronic communications with unprecedented capacity and flexibility. NGN is throughout based on the Internet Protocol (IP). Thus, NGN is able to offer multiple services (e.g. voice, data, multimedia; synchronous, asynchronous; mobile, fixed; broadcast, point cast) over a single platform independent of underlying physical technology (fibre, coax, copper, radio). Compared to traditional (and presently still prevailing) Public Switched Telephone Networks (PSTN) and other dedicated specialized networks NGN is by far more efficient because it integrates all former networks and because it can deliver its powerful services based on a much less complex architecture (number of nodes, service and management needs). However, these much wanted characteristics also call for a rethinking, adaptation and revision of traditional regulatory policies regarding electronic communications.

NGN consists of three sub networks that altogether form the NGN (e.g. ITU, Tanenbaum, A.S., OECD) – see Figure 1 below:

- NGN Core Net comprises all components dedicated to long distance transmission of electronic signals (via whatever technical means – e.g. fibre, satellite, terrestrial radio beam)
- NGN Backhaul Net has the task to concentrate the traffic coming from the end-users and to direct that traffic into the Core Net (and vice versa).
- NGN Access Net allows end-customers (private households, businesses, and administrations) to access the NGN by tapping a node of the NGN. As can be seen in **Error! Reference source not found.** this access can be organized through various means. It is only the NGN Access Net that is subject of the present paper. This will be called NGA in what follows.

Figure 1: Structure of NGN



Source: Own illustration

Based on this brief description I will address in the following paragraphs major regulatory challenges and recommendations that should be met in order to ensure a beneficial use and a speedy roll-out of NGA.

2. TECHNOLOGICAL NEUTRALITY

As mentioned NGN is not related to one specific technological solution but is characterized by its functions. The same is true for NGA. Fig. 1 represents on its right side a variety of physical technologies that are able to provide NGA. These means of access include fibre, coax/cable, and copper/DSL lines as well as wireless connections (e.g. Wi-Fi, WiMax, and UMTS).

Given this background and in accordance with the present European Directives[4] it is advisable and necessary *to formulate regulatory measures such that no specific NGA technology is preferred or hindered*. This regulatory principle of technological neutrality guarantees a sound competition between existing access technologies as well as sufficient room for innovative initiatives regarding access solutions. Besides existing technologies, this approach therefore includes new, innovative technologies as well as upgrades to existing technologies like cable.

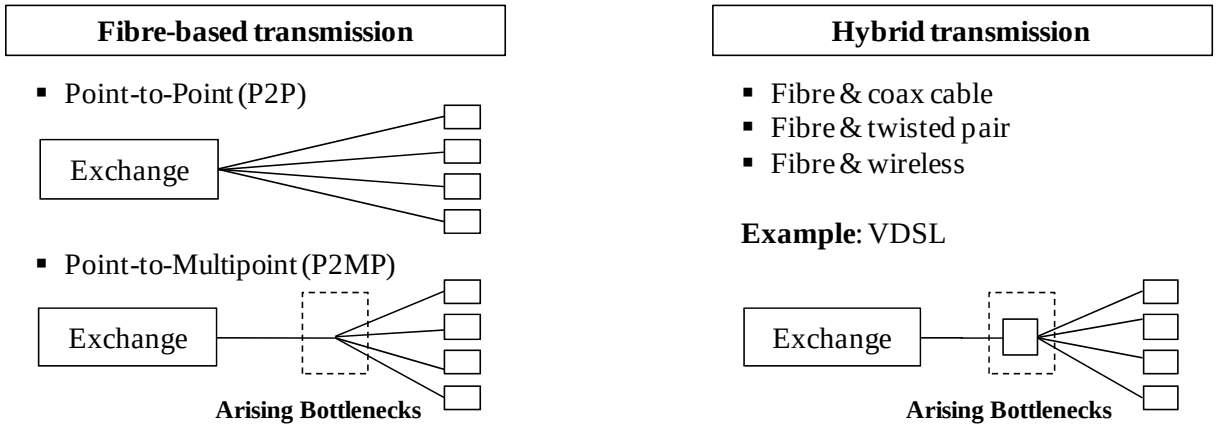
3. ACCESS AND BOTTLENECKS

Regulatory intervention is called for if a market entrant cannot reasonably be expected to replicate a network or network component needed for his business plan that is already in place. In case that such a *bottleneck* exists and that no reasonable functional alternative can be chosen the regulator has to ensure competitive access to that part of the network if the owner of the bottleneck and the new entrant cannot reach an agreement on a voluntary basis.

In the case of NGA the potential bottleneck very much depends on the structure of the access technology. However, exchange points can be regarded as natural bottlenecks in almost any case. Figure 2 describes in a schematic fashion major technological access alternatives in NGA.

[4] OJ L 108, 24.04.2002, p. 35, Nr. 18

Figure 2: Technological NGA Alternatives



Source: Own illustration based on (Reynolds, T)

Architecture and topology of NGA vary considerably with regard to the underlying technological solution. In a *pure fibre access world* there are two different architectures, namely Point-to-Point – P2P - (each final customer is served with an exclusive fibre wire originating from a central exchange) and Point-to-Multipoint – P2MP - (the central exchange supplies a street cabinet or a cabinet in a building with a fibre wire; in the cabinet a splitter splices the fibre into fibre loops for each final customer).

It can easily been imagined that in these two cases the bottleneck situation will be different. Under P2P-conditions a new entrant has to consider the possibility to replicate or setup a new infrastructure. If such a replication cannot be regarded as reasonable (e.g. because of insufficient space in or lack of ducts; no right to deploy fibre wire over the air) the P2P-loop forms a bottleneck calling for granting competitive access at the exchange node (e.g. through bit stream or local loop unbundling – LLU – with regard to dark fibre or wavelength). The competitor joins with his own equipment at the exchange. However, in a P2MP-situation the bottleneck question is different. It might be reasonable to expect that a competitor draws a fibre line from the exchange (where he has installed his own equipment) to the cabinet. Now the cabinet forms the bottleneck where access must be granted (e.g. through local loop unbundling) since under most circumstances it is neither reasonable nor feasible to replicate the lines from the cabinet to the single end customers. The competitor's investment (fibre to the cabinet and equipment in the cabinet) will only be efficient if he can gain a sufficient number of final customers. Since the number of customers connected behind the cabinet is not very large (number varying between rural and metropolitan areas) there is only room for very few competitors in this scenario. All other competitors asking for access must rely on bit stream access on a higher level of the network, if for reasons of significant market power (SMP) access has to be granted by regulatory means at all.

In the scenario of *hybrid access* (combination of fibre and some other access technology; example VDSL) the bottleneck situation is similar to the P2MP-case.

Recent research claims that in the context of NGA there may only be room for 1-2 players (e.g. Elixmann, D. et al. and ERG, p. 4[5]), who can efficiently run an access business based on infrastructure investment. The reason for this situation can be found in high roll-out costs and increasing economies of scale and scope that come with NGN (e.g. ERG, p. VI[6]).

[5] ERG states that "for the time being it is uncertain what the minimum scale exactly is."
[6] "NGA investments are likely to reinforce the importance of scale and scope economies, thereby reducing the degree of replicability, potentially leading to an enduring economic bottleneck."

In direct fibre, costs per line are higher than in the traditional PSTN world. In P2MP or hybrid solutions, number of users per node goes down due to nodes moving closer to the customers, which results in higher average costs per user (e.g. Reynolds, R., Elixmann, D. et al.).

NGA will provide powerful and efficient electronic communication. At the same time it will create new and sustaining bottlenecks whose properties depend on the access topology employed and on the overall competitive situation. Only if NGA is complemented by well functioning competing infrastructure of similar performance (for the time being only digitized cable seems to have this potential) a market structure may evolve that might bring about some tendency towards effective competition. However this will only emerge in urban and metropolitan environments and will often result in some kind of duopoly whose competition potential is contested and needs tight regulatory oversight.

It becomes, thus, evident that, for the sake of competition and customer welfare, in most practical circumstances and depending on the access technologies used regulation of NGA will have to care for *non discriminatory access* to existing and future bottlenecks in passive and active infrastructure (e.g. through access right and unbundling obligations) and also for non discriminatory access to customer premise equipment (e.g. through bit stream) (Picot, A. and Wernick, C., p. 666). It remains to be seen if and to what extent the traditional investment ladder approach may be beneficial in order to spur additional infrastructure investments (see section 8). *Ensuring wholesale access to bottlenecks is crucial in the absence of effective infrastructure competition and thus will bring competitive forces into NGA and help to enrich service offerings for end-users.*

4. NETWORK NEUTRALITY

In future, the vast majority of all information and communication activities – in private life as well as in business and administration – will take digital shape and will increasingly rely on electronic infrastructures. Convergence of networks, devices, and media will speed up this development. So does NGN with its high performance and flexibility. Whoever wants to engage in communication - individual or community or mass - or wants to retrieve (download) or to offer (upload) professional or personal information must use the internet and its infrastructures. Unfettered use of the internet becomes a sort of public good that has to be flanked by public policy. Due to this outstanding relevance non discriminatory use of the internet gains highest societal relevance. Therefore, neutrality of access networks with respect to information and services used by customers becomes a necessity for the evolving information society. Network neutrality represents the principle of equal user access to the internet and its services, applications, and contents without restrictions or discrimination by the network access provider. Due to consumers' switching costs between access networks, network neutrality has to be guaranteed by any access provider (van Schewick, B., p. 371).

NGN offers tools for inspecting the quality of data packages and, thus, for discriminating between them. This new potential calls for transparent information regarding the handling of services and content (Chirico et al., p. 26). Against this background *no discriminatory behaviour of NGA providers with respect to customers' use of upload, download or other services should be permitted without ex ante and comprehensive public information of any such policy.*

It must be noted, however, that some customers may demand discrimination between data packages in order to enjoy a better quality of specific services. To the extent that such quality of service (QoS) activities are technically feasible and commercially successful, i.e. requested by customers, they could become part of an access provider's business model.

From a regulatory standpoint QoS offerings by means of NGN are acceptable in principle, but should only be allowed with a basic service free of any discrimination and with transparent information about all business conditions involved regarding special treatment of selected services.

5. EXISTING INVESTMENTS IN NGA AND REGULATORY INCENTIVES

The actual revision of the EU framework for electronic communications networks and services aims, among others at facilitating and inducing new investment into NGA. This endeavour must take into account that several NGA deployments are currently being realized by private investors without regulatory tail wind. In a number of Member States (e.g. France, Germany, Italy, Netherlands, Sweden, UK) NGA projects are under way or even already in operation ([7]). Initiators of these investments are incumbents or new competitors as well as public private partnerships involving local governments. NGA technologies that are rolled out in these projects range from FTTC (VDSL) over FTTB to FTTH. These projects mainly take place in metropolitan or urban areas.

It, therefore, seems evident that in certain areas of the EU market conditions are working in favour of new NGA investment and that to this extent NGA investment is possible without specific regulatory support.

Consequently, regulatory measures in favour of NGA investment should be designed such that

- *existing NGA business cases are not deteriorated,*
- *new investment in areas suitable for private investment is not discouraged nor unnecessarily subsidized,*
- *investment incentives generated through regulation unfold their effects in those regions only that otherwise would not be attractive for private NGA investment.*

For the time being regulation based NGA investment will have a high demand in sparsely populated areas and small communities.

[7] Projects include NetCologne, Hansenet (Germany), CityNet Amsterdam (Netherlands), Free (France), FastWeb (Italy), Bredbandsbolaget (Sweden), BT (UK).
See e.g. http://www.netcologne.de/unternehmen/presse/presse-archiv.html;
http://www.capital.de/unternehmen/100008050.html;
http://www.zdnetasia.com/news/communications/0,39044192,62015491,00.htm;
http://www.broadbandhomecentral.com/report/backissues/Report0303_6.html;
http://whitepapers.zdnet.co.uk/0,1000000651,260177225p,00.htm; http://marketmettle.com/knowbt/70-bt-commits-to-15bn-fibre-rollout

6. MARKET SIGNALS AND REGULATED ACCESS

Investment into infrastructure (like NGA) is long term oriented by nature and must calculate costs and revenues in the long run. New fixed cost intensive infrastructures create high unit costs at the beginning and will reach very low and highly competitive unit costs only with a high rate of market penetration (mass market). This situation increases perceived investment uncertainty.

Taking this situation into account and in order to promote inclination for NGA investment, regulation should act in two directions:

1. *Improve information on regulatory and market conditions and send reliable signals to the market, especially*
    a. *publish markets prone to regulation and regulatory measures early on*
    b. *determine suitable (i.e. not too short) revision cycles for definition and analysis of market conditions; a revision cycle of three years for markets in the field of NGA seems short and might even increase uncertainty of investors who have to follow a much longer time horizon in their investment decisions*
    c. *ensure transparency of incumbents' plans for NGN/NGA rollout to avoid stranded investments.*
2. *Take active measures to speed up and increase efficient utilization of new infrastructure, especially through*
    a. *enabling open NGA networks through access with regulated access prices where infrastructure competition between NGA providers is insufficient; this is typically the case if there are less than three functionally equivalent access providers*
    b. *aligning regulation of access prices with long-term incremental costs, penetration path and extent of wholesale customers' commitment regarding volume and duration of business*
    c. *proposing models for investment and risk sharing between potential investors and access customers.*

To a larger part, the principles outlined above are already reflected in ITRE's proposed amendments, e.g. to Art. 13 paragraph 4 (a) Access Directive (EP 2008 (a)). However, all of the above aspects deserve further attention and detailed scrutiny. Some of this will be addressed in the following.

7. INVESTMENT SHARING

With regard to risks and capital intensity involved it is sometimes proposed to design NGA investments in a cooperative fashion in order to share investment risks and to speed up rollout (*joint investment*). Partners in such a shared investment might be competing network providers, financial investors, vendors, local governments or customers. There are different modes to organize joint investment, e.g.

- joint venture (joint company with similar or different shareholdings of partners)
- (long-term) contracts covering, among others, allocation of costs and revenues, network management, upfront payments and obligations of customers if involved as partners.

In a competitive market economy joint investment is done on a *voluntary* basis. If voluntary joint investment arises in one mode or another it is necessary to assess from a regulatory perspective whether the specific form of that initiative (portfolio of partners, governance structure, contractual clauses, interlocking with other consortia, etc.) will enhance or reduce competition in the respective access market and for that matter will increase or decrease SMP. With other words: *Does a specific form of shared investment lead to collusive and potentially anti-competitive behaviour or to higher efficiency and more beneficial investment? Both avenues are possible. A competent regulatory oversight is, therefore, mandated.*

ITRE's proposed amendment to Art. 12 paragraph 2a seems to address some sort of *mandatory joint investment*. The wording is not unambiguous. Thus, it could at least be interpreted in a way that opens up the way to mandatory investment sharing to be enforced by the regulator:

> *"Member States shall ensure that national regulatory authorities are empowered to require that the holders of the rights referred to in paragraph 1 share facilities or property (including physical co-location) in order to encourage efficient investment in infrastructure and the promotion of innovation, after an appropriate period of public consultation, during which all interested parties shall be given the opportunity to express their views. Such sharing or coordination arrangements may include rules for apportioning the costs of facility or property sharing and shall ensure that there is an adequate sharing of risks between the undertakings concerned."*

If the preceding clause was to be understood as a regulatory tool for implementing joint investment imposed by regulatory decision making (resulting in "sharing and coordination agreements") it came close to a sort of public control of private investment in the tradition of planned economies. *This would shift responsibility and risks from the private to the public sector with all kind of unintended consequences.*

Investment sharing may not only be seen as joint investment, but also as *joint usage* of infrastructure. In this case we are talking about access to existing or arising infrastructure and equipment in the realm of NGA. Of course, all classical instruments apply in this case, in particular: access to passive infrastructure (public or private) according to public law and regulatory remedies with regard to bottlenecks; voluntary negotiation and commercial agreements on access prices in unregulated markets; regulated access prices in SMP markets following the principles outlined in section 6.

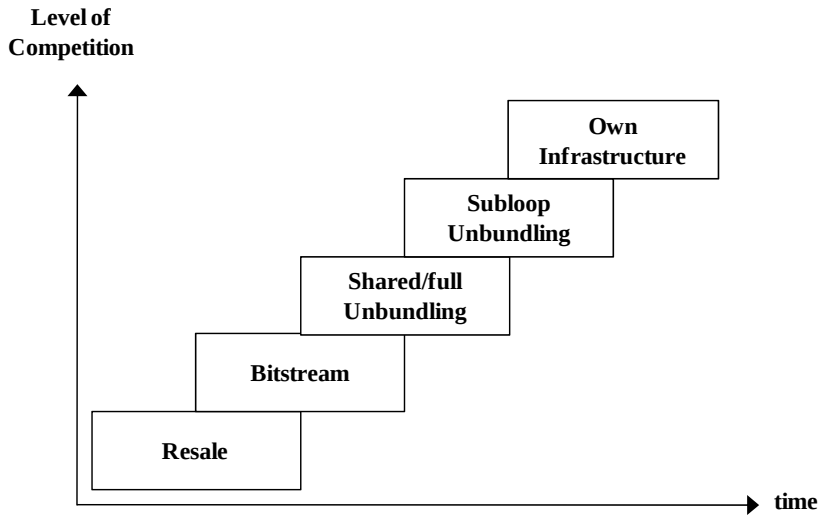
At various points ([8]) ITRE's amendments call for an additional *risk premium* that should be added to the regulated access price. This potential future instrument demands further clarification. What is meant by "risk premium"? Long-term incremental costs form the basis of regulated access prices. As a major component these costs include capital costs. It is common sense that capital costs have to be calculated by the regulator according to the specific risks that the capital investment has to carry and that is also reflected in the capital market. Hence, capital costs do already include a risk premium. What kind of additional risk premium is addressed by the proposed amendment and according to what criteria should it be calculated without becoming arbitrary? *Without a precise conceptualization the proposed additional risk premium would cause considerable inconsistencies and difficulties for regulatory practice.*

[8] See e.g. EP (2008a), Art. 13, 4a. and Reding, V.

8. LADDER OF INVESTMENT

So far, regulatory philosophy in European telecommunications was also guided by the concept of ladder of investment (Cave, M. and Vogelsang, I.). This concept assumes that transforming a traditional monopolistic infrastructure (PSTN, copper) into a competitive system needs step by step an evolution ofcompeting business. Starting from simple resale of the incumbent's service products to consumers over interconnecting of competitors' own network components with incumbent's networks to offering of an own rival infrastructure intensity of competition in telecommunications should grow (Figure 3).

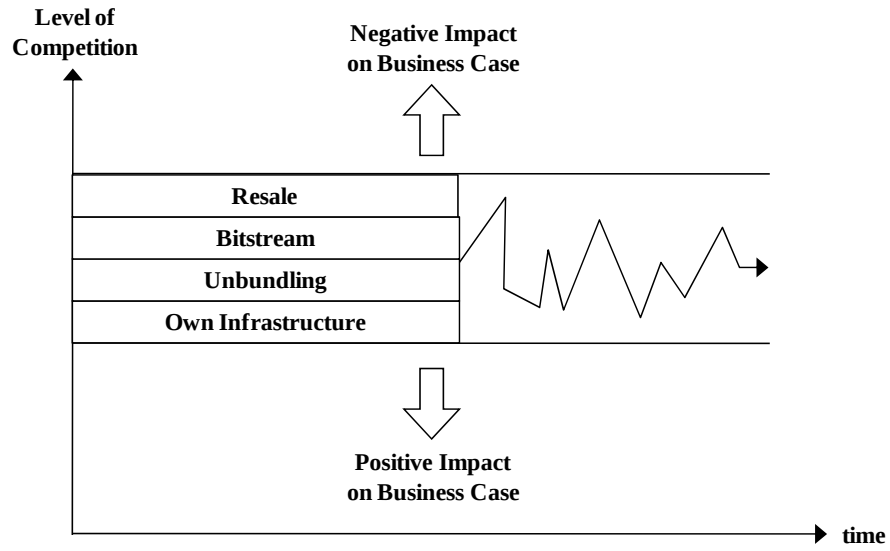
Figure 3: Ladder of investment for traditional world of PSTN infrastructure



Source: Cave, M. and Vogelsang, I..

This approach implies that in the end there is enough room for several infrastructure providers to effectively compete against each other. The picture changes with the advent of NGA. Now, competition has to be organized with respect to an infrastructure that has not yet been rolled out and that is equipped with much higher economies of scale and scope and, thus, less space for competing infrastructures. In consequence, application of the traditional investment ladder approach will not work. Since an NGA investor will take into account the regulatory regime facing his investment the early setting of regulatory conditions for NGN is important for creating a predictable environment. The regulatory approach to NGA has to define a wanted level of competition and a corridor within which competition takes place. Deviating from that corridor will either open up monopolistic opportunities for the investor or, in the other direction, deterioration of his business case (Figure 4).

Figure 4: Organization of competition in an NGA world



Source: own illustration

As outlined above, in most cases there will be less than three functionally equivalent NGA providers in a specific market. This situation calls for regulatory action in order to introduce competitive forces and service alternatives to the benefit of customers. *The regulatory measures consist in a much "condensed" version of the investment ladder with resale, bit stream access, and unbundled local loop as major instruments for bringing rival offerings to the market.*

9. RELEVANT MARKETS

The European Regulatory Framework for Electronic Communications Networks and Services is only applicable to certain relevant markets. It has to be checked which of these markets would be addressed by NGA. At first sight, only market 4 (Wholesale (physical) network, infrastructure access (including shared or fully unbundled access) at location) and market 5 (Wholesale broadband access, comprising physical or virtual network access including 'bit-stream' access at fixed location) come into question. One has, however, to decide whether physical NGA would be different to "(physical) network infrastructure access" (market 4) and NGA could be different to "broadband access" (market 5). Given the principle of technological neutrality, no principal difference between NGA and the two market definitions can be found. *Therefore, the two relevant markets will also cover NGA and NGA will have to undergo the three criteria test ([9]) in both markets.* As conditions for NGA roll-out are very different in metropolitan compared to rural markets it might turn out that specific sub national markets for NGA have to be defined and regulated.

[9] OJ L 108, 24/04/2002, p.51-77

10. SUB NATIONAL MARKETS

Lisbon Strategy of the EU points out to make the European Union “the most competitive and Dynamic knowledge-driven economy by 2010” (EP, 2000). This includes availability of broadband capacity to all European citizens, no matter where they live. So do the recitals of the Directive of the European Parliament and of the Council. NGA represents a major group of technologies to support realization of that goal. However, the present situation in broadband access does not come close to this objective. On the contrary, *digital divide* between metropolitan and rural areas tends to widen (COM(2006) 129 final).

Broadband coverage in *metropolitan* areas tends to improve and to create a sustainable competition level:

- An increasing number of privately initiated FTTx deployments in major European cities can be observed.
- Competitive and functionally more or less equivalent offerings are in place (cable, advanced DSL, high performance wireless access such as UMTS).
- A variety of passive infrastructural components (ducts etc.) is easily accessible thereby facilitating the roll-out of competing infrastructure.

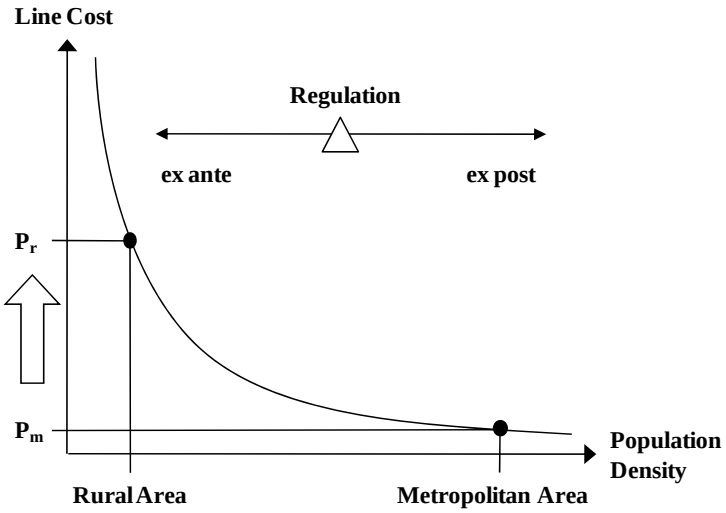
Rural broadband coverage, on the other hand, is lagging behind with increasing distance to the level reached in metropolitan areas:

- Access to relevant nodes is more difficult and costly.
- Accessible passive infrastructure is rare.
- So far, broadband supply, if available at all, is mostly limited to one technology (e.g. DSL or satellite).
- There are only very few or even no private NGA business plans for rural areas under discussion; PPP approaches for rural broadband roll-out are only in initial stages in some areas.

Consequently, there is an accelerating pace towards a two tier society: online and offline - with potential negative welfare effects for the respective member states and for the entire Union.

Figure 5 summarizes the situation and outlines conclusions for regulation.

Figure 5: Line Cost by region, sub national markets and regulation



Source: own illustration

As Figure 5 shows there are actually much higher costs per line in the less populated areas. In regions with high population density one can observe a tendency towards NGA competition leading in some areas even to a situation where an ex post regulation could suffice. In less densely populated and rural areas, however, ex ante regulation must prevail in order to ensure sufficient supply of broadband access and service competition. It will be mainly in those sub national markets that are outside metropolitan areas where regulatory rules for risk and investment sharing (see sections 6 and 7 above) will have to take place. *Such definition of sub national markets marks a deviation from traditional regulatory principles that called for unitary pricing on a national level – a postulate that does not exist in most other markets. Accepting considerable price differentials for NGA between cities and villages poses a political challenge that has to be dealt with.* Yet, on basis of well defined and intelligently regulated sub national markets it will be possible to serve the entire country better and to help fulfil Lisbon strategic goals.

11. UNIVERSAL SERVICE

Currently, universal service obligation as defined by EU must be described as outdated. *European Universal Service Directive demands 56 kBit/s*[10] as minimum service level in telecommunications. It goes without saying that this threshold has nothing to do with having adequate access in an information society. National legislation of Member States can exceed that level only with help of national tax money, not by using the universal service procedures of the national telecommunications laws. Switzerland has implemented a universal service obligation of 600 kBit/s ([11]); the FCC has recently defined "*basic broadband*" with at least *768 kBit/s ([12]).*

A modernization and updating of the European Universal Service Directive with respect to broadband is urgently needed. This will help to bring about broadband coverage to those mostly rural areas that otherwise will not be sufficiently served and where regulation of access as well as sharing of risks and investments alone will not suffice to serve the population.

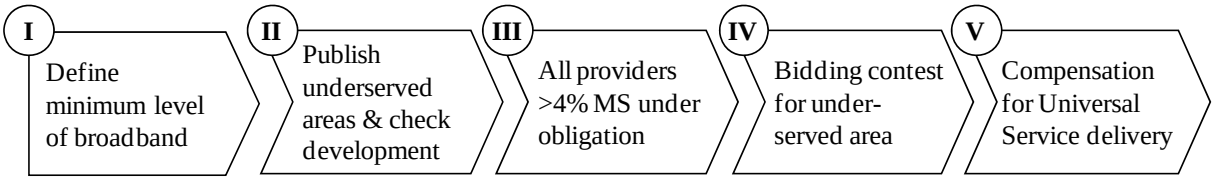
[10] e.g. OJ L 108, 24.04.2002, p. 52, Nr. 8
[11] e.g. OECD, 2008, p. 38 and http://www.bakom.ch/themen/telekom/00457/
[12] e.g. http://www.fcc.gov/WCB_031908_open_meeting_slides.pdf

Depending on the level prescribed, universal service will be applicable for some or few areas and regions. Yet, it is important to include those often remote regions into information society.

In light of the dynamics of technologies and service offerings the European Union should *revise its Universal Service Directive in a regular rhythm*, e.g. every three years. This will help to cope with the factual development of markets and society, to send reliable signals to the markets, and to prevent avoidable gaps.

Fulfilment of universal service obligations should not be financed through some Universal Service Fund that is directly fuelled by customers or market players. *Such obligations should rather be managed through an indirect incentive system*, e.g. according to the one in place in the German Telecommunications Law. It works according to the following logic (Figure 6):

Figure 6: Management of universal service obligations



Source: own illustration

After the authorities have defined a minimum level of broadband availability (I) underserved areas are published and regularly checked as to what progress has been made (II). If progress is not satisfactory, all providers with a market share of (e.g.) > 4 % will be obliged to finance the missing infrastructure in proportion to their relative market share (III). The regulator publishes an invitation to tender for the underserved areas and grants contracts in a bidding contest (IV). Based on step III the contracts are paid for by the market players (V).

According to experience to date, this format provides maximum incentive to serve an area without formal obligation and, at the same time, avoids misuse of universal service funds that can be observed in some countries. Thus, *it creates an implicit "race to invest" in otherwise unattractive areas* among NGA market players.

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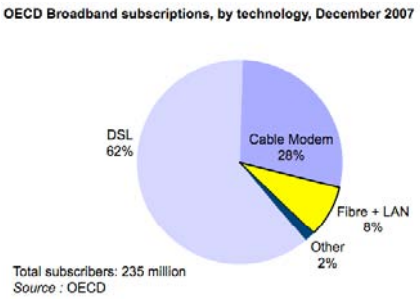
ANNEX I: WORKSHOP PRESENTATIONS

Policy Goals and Challenges

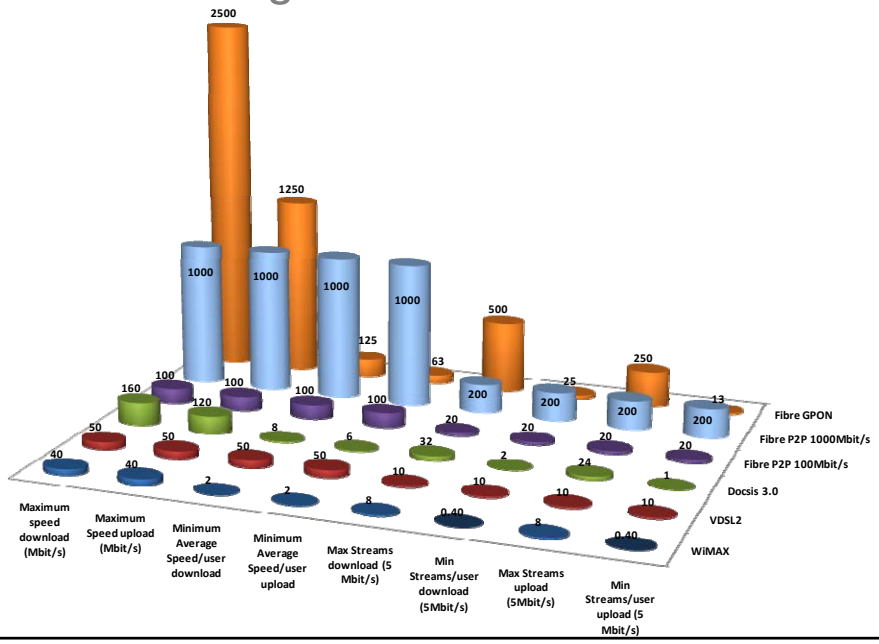
- Last 10 years in telecommunication sector have been spent developing **effective competition** -> price declines, new services, innovation, improved quality, benefit to consumers and users;
- Positive results from competition are being challenged by characteristics of next generation access technologies;
- Need to continue to stress goal of creating effective competition.

Fibre vs. other broadband technologies

- **Fibre** a small but growing technology to access broadband;
- Not all OECD or EC countries have well developed cable TV infrastructures;
- Access has depended on **local loop unbundling** and in recent years the build-out of some infrastructure (but limited).



Next generation networks



Next Generation Access networks

- Why NGA? Higher speeds enable provision of new enhanced services, boost to innovation and content creation, economic & social benefits (telework, healthcare, environment).

- Benefits of NGA will depend on access opportunities to fibre networks by competing service providers and 3rd party service firms.
- Insufficient competition will lead to high prices, slow diffusion and slow innovation.

Ultimate fibre goal: Infrastructure competition?

- OECD research* shows that investment decisions will be very closely tied to expected penetration rates.

- Most markets will not be able to sustain more than one FTTH or VDSL operator

*OECD, Development in fibre technology and investment. 2008. http://www.olis.oecd.org/olis/2007doc.nsf/LinkTo/NT00005E06/$FILE/JT03243516.PDF.

Ultimate fibre goal: Effective competition

- Infrastructure competition unlikely in most markets
- Wireless technologies not full substitutes for wired broadband networks.
- Duopolies do not necessarily guarantee effective competition. Likely to create SMP and reduce service-level competition.
- One provider offering fibre to the home is good, however need to ensure competitive fibre access.

http://i.pbase.com/o3/24/598024/1/78189271.bxSxEGlu.asia0044copy.jpg

Competition: Unbundling

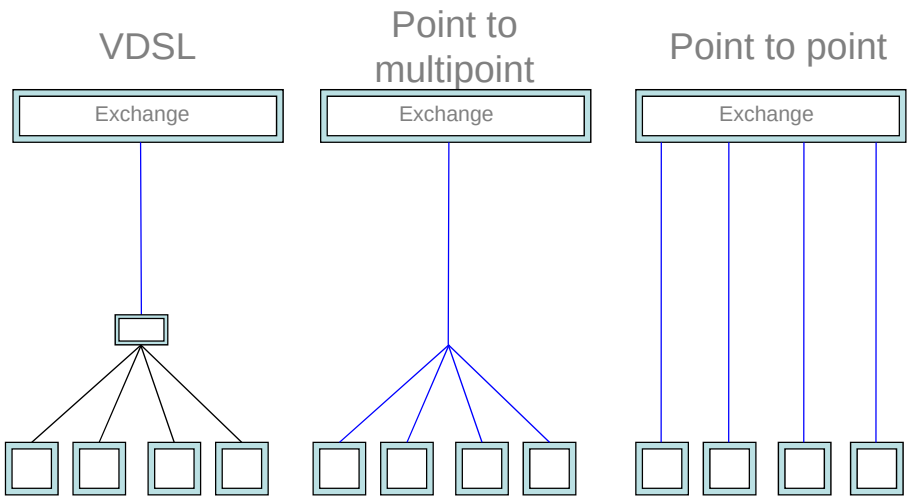
DSL

X

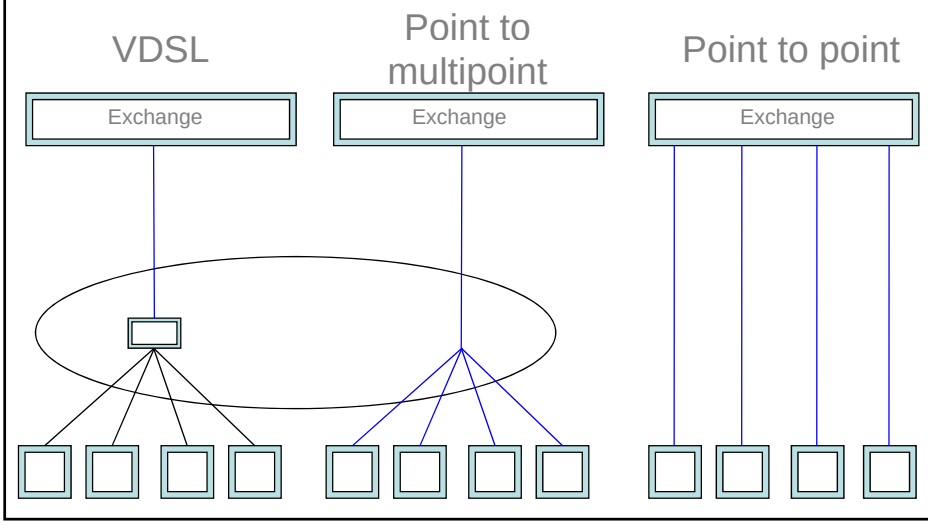
Fibre

?

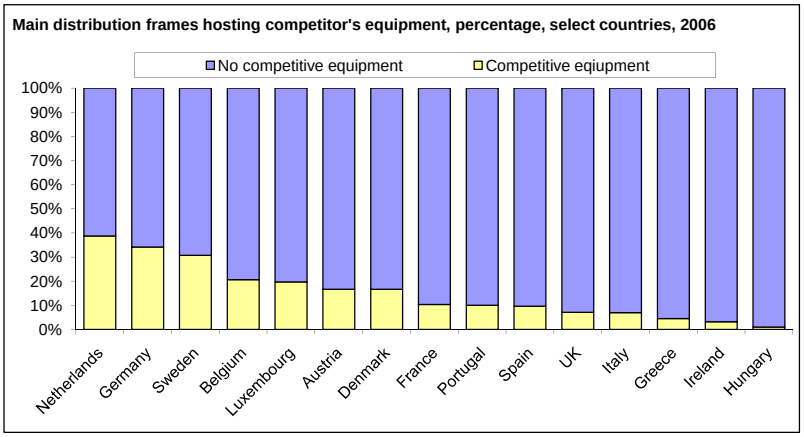
Fibre Networks: Topology matters



Problem areas for competition

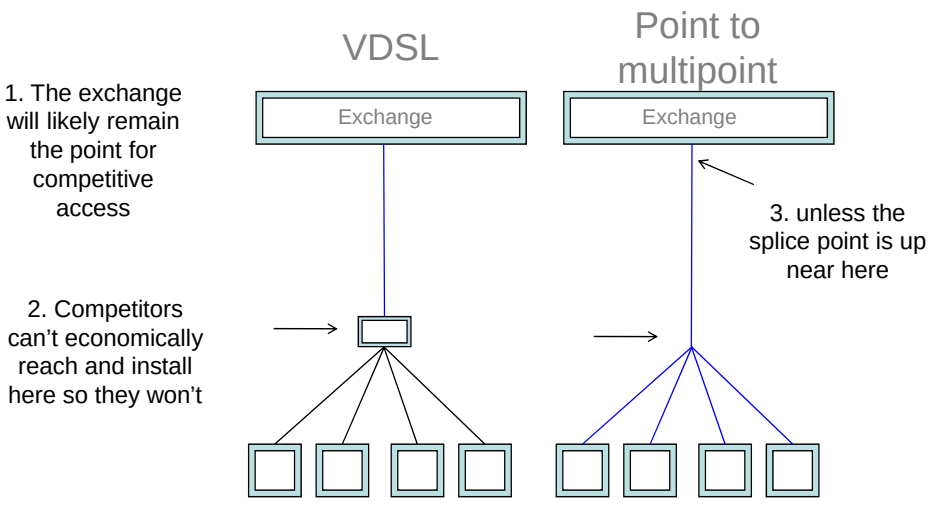


VDSL/P2MP:
What to expect at the cabinet/splice



Source: ECTA

Access: Reality check



Innovation thrives when competitors take over lines

Free (France) service offer		
	No unbundling	**Unbundling**
Download (Mbit/s)	10	28
Upload (Mbit/s)	1	1
Telephone	Free, 70 countries	Free, 70 countries
Television	-	200 channels
TV perso	-	Yes
Digital TV recorder	-	Yes
VoD	-	Yes
Radio	-	50 digital channels
Price	EUR 29.90 + fixed line	EUR 29.90

Source: http://adsl.free.fr/offre/grille.pdf

Current debates: wholesale access

- Bell Canada traffic shapes peer-to-peer traffic using deep packet inspection
- Bell Canada also applies the same traffic shaping to the connections of its wholesale customers

Access: Price of Entry

- Development of effective competition in access markets must be based on efficient (cost-based) prices;
- Cost-based prices include premium for return on investment (risk);
- Concepts of supplementary charge for risk-sharing will distort investment decisions, possibly lead to cost-padding;
- New entrants paying cost-based prices reduce risks by helping to grow the market as well as compensating network owner for investment

What happens if NGAs lead to SMP in the market?

- Fibre in local loop without effective unbundling is likely to lead to SMP? What tools are available to the regulator?
- Wholesale broadband access? Will this be sufficient and provide equivalence of access?
- Functional separation important as measure of last resort

Governments and regulators needs to be cognizant of:

- Economic and technical characteristics of different possible **network topologies** for the roll-out of fibre.
- Implications for the future development of **competition** in access markets.
- In particular: waiving open access requirements in return for investment in fibre may lead to remonopolization.

Conclusions / key findings

- This is a once in a generation upgrade. We need to get continue to stress the goal of creating **effective competition**.
- The **topology** of the network will affect the amount of competition.
- Many markets will be unable to support more than one fibre rollout. In those areas we need to have a way to **support the competition that we currently rely on**.
- Most OECD countries rely on unbundling, but point-to-multipoint topologies (VDSL & PON) **complicate the competitive access model** and may limit innovation.
- When governments intervene they must seek to **improve competition** and operate under **open-access rules**.
- **Functional/structural separation** needs to be an option.


OECD
ORGANISATION FOR ECONOMIC
CO-OPERATION AND DEVELOPMENT
Thank you

Committee on Industry, Research and Energy

European Parliament

July 15 2008

Workshop on Next Generation Access

'Safeguarding Competition and Consumer Choice through Regulation'

Martin Cave

Warwick Business School, UK

Martin.Cave@wbs.ac.uk

Next Generation Networks

Core

- uses IP
- combines PSTN and specialised networks
- cost-reducing
- no regulatory problems – enhances competition

Access

- versatile; delivers many services
- high speed
- other characteristics (symmetry, reliability, latency)

What count as an NGA?

They are high speed broadband networks

Including,

- replacement for copper network
  - fibre to the node/cabinet
  - fibre to the home/premises
- upgraded cable networks, eg. DOCSIS 3.0
- neighbourhood networks
- high speed fixed wireless (Wi-Max)
- high speed mobile networks?

Who wants NGAs?

Past trends show demand for speed increasing 10-fold every 5 years- ie to 50 Mbps in 2013

Applications include:

Web 2.0

in-home wireless distribution systems

streaming applications with low error rate and symmetry

HD content, including internet TV

Is copper good enough? ADSL speeds in UK (Mbps)

	Downstream	
	ADSL	ADSL2+
Claimed	8	24
Median	5	9-10
Available to 90% of population	2	2.5

Standard Platform Endowments in Europe

2F + W: Upgraded cable system, ubiquitous DSL, 3G networks

F + W: (Near) ubiquitous DSL, 3G networks

W: Wireless only- 2G/3G; prospectively Wi-Max

The legacy of current generation broadband

- 90 million fixed subscribers in EU
- 15% of these cable
- DSL subscribers split equally between incumbent and entrants
- More than half of entrants use unbundled loops (problem as NGAs' architecture does not accommodate LLU)
- Growing number of broadband subscribers use wireless (44% in Austria)

What Triggers NGA Investment?

- Competitive rivalry
- Certain regulatory deal offering adequate (non truncated) return.

The role of competition in NGA investment:

Under monopoly:

extra revenue + operational cost savings – annualised capital costs + scrap value of copper

Under competition:

As above:

+ revenue captured from competitors

+ revenue defended from competitors

The case for geographic market definition

3 areas:

- Potentially competitive
- Non-competitive
- Non-commercial

Potentially competitive areas

How many competitors are enough to justify forbearance?

Precedents include

- 2F + wireless (US)
- ≥ 4F (UK wholesale broadband access notification)

Depends on market stage: fierce competition may erupt for new customers, but risk of long term collusion is high.

Areas without effective competition: regulatory options

What should be regulated at LRIC price?

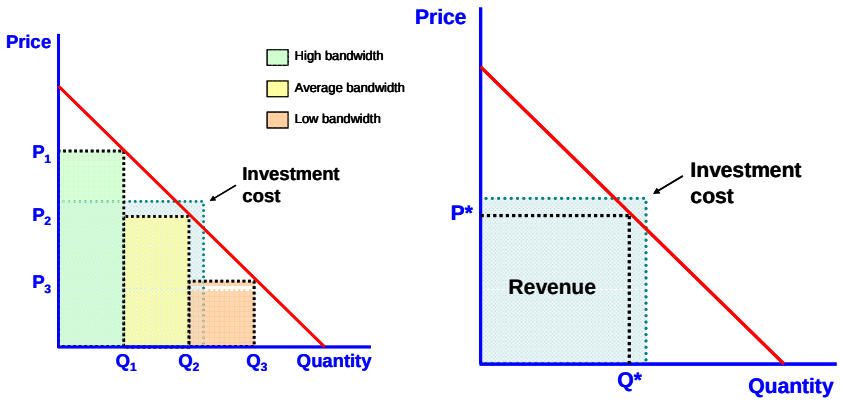
Access

- to provide all services
- to provide basic service only
- with pricing flexibility
- at a higher cost of capital to reflect risk

+ additional risk-sharing options

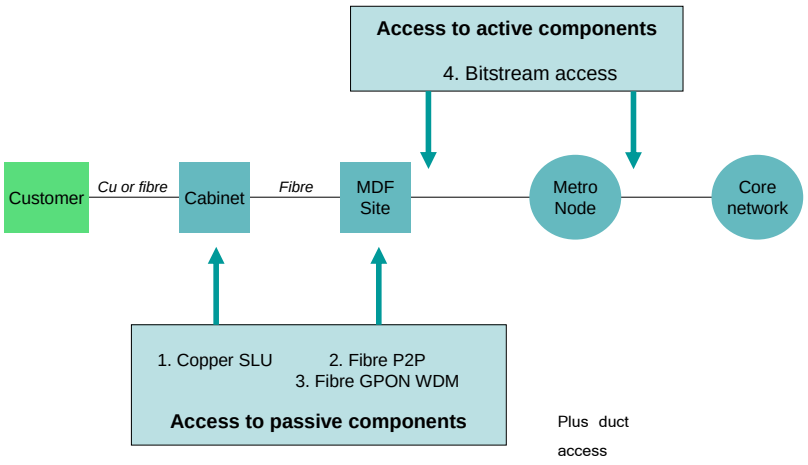
Incentives to bring roll-out forward are weaker here

Why pricing flexibility may be needed



Price discrimination increases revenue

Points of Access to NGA networks



NGAs and the Separation Debate .

Pro separation

- Makes a fresh start and counters risk of non-price discrimination

Anti separation

- Costly
- Cuts access provider off from end users
- Unnecessary if NGA is designed transparently
- Makes investment co-ordination difficult

Non-Commercial Areas

These require public subsidies–for example:

- Australian tender to provide 12 Mbps to 98% of population
- Singapore tender for ubiquitous 100 Mbps service
- Proposal from Irish operator for public subsidy to extend coverage
- Numerous local examples of municipal fibre– the City of Amsterdam, Swedish municipal electricity companies, Greek islands etc.

Issues in promoting coverage

Timing: when is a universal service obligation appropriate (in Europe only Switzerland has a broadband USO, at 600 kbps)

Modalities: wireless is probably the cheapest option, so technological neutrality is essential

Spectrum policy: cheap spectrum should be readily available in rural areas.

Fakultät für Betriebswirtschaft
Munich School of Management

Safeguarding Competition and Consumer Choice through Regulation

ITRE Workshop on: *Next („Now") Generation Access (NGA)*
European Parliament
Brussels 15 July 2008

Arnold Picot
Institute for Information, Organization and Management
www.iom.bwl.lmu.de

Agenda

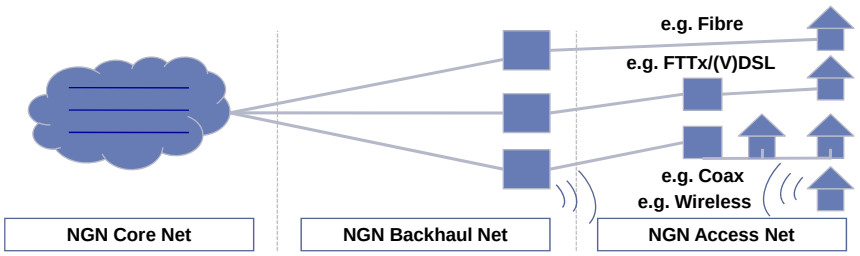
Challenges for NGA Regulation

1. Technological Neutrality
2. Access
3. Network Neutrality
4. Existing Investments
5. Investment Uncertainty
6. Investment Sharing
7. Ladder of Investment
8. Relevant Markets
9. Subnational Markets
10. Universal Service

1 Technological Neutrality

Regulatory measures for NGA have to be designed independently of a particular type of technology.

NGA Access Network Topology[1)]



- Next generation access (NGA) allows end-customers (private households, business) to access NGN
- Facilitated symetric use (upload and download
- Major characteristics of NGN:
  - IP based broadband with capacity
  - Provisioning of multiple services over a single platform independent of underlying infrastructure
  - Reduced network complexity (no. of nodes, service and management needs)

Source: [1)] In accordance with ITU (2004), Tanenbaum (2003) and OECD (2005)

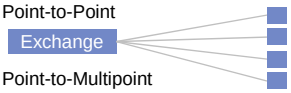
2 Access

With the advent of NGA, regulation has to strike an adjusted balance between ensuring efficient access and promoting competitive investment.

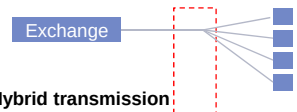
Technological Alternatives[1)]

Fibre-based transmission

- Point-to-Point



- Point-to-Multipoint



Hybrid transmission

- Fibre & coax cable
- Fibre & twisted pair
- Fibre & wireless

Example: VDSL

Bottlenecks

Physical[2)]

- Local loop
- Ducts, dark fibre, fibre
- Wavelength
- Manholes, street cabinets
- Metro, sewer
- Other

Economic

- High rollout costs for (replication of) infrastructure
- Increasing importance of economies of scale and scope[3)]
- Less room for competing infrastructures

→Direct fibre: cost per line ↑
→Hybrid: cost per user ↑ (no of users per node ↓)

I Non discriminatory access to existing and future bottlenecks in infrastructure and equipment

II Non discriminatory access to IP CPE* independent of local loop technology

Source: 1) e.g. OECD; 2) e.g. Unofficial consolidated Version of Access Directive 2002/21/EC (ITRE Version) Art. 12.
3) ERG Opinion on Regulatory Principles of NGA
* Customer Premises Equipment

3 Network Neutrality

Due to consumers' switching costs Network Neutrality is of major importance; deviation from neutral handling of data must be made transparent.

Transparency

Supply driven
Equal treatment for all content, services, and network providers

→ High potential for discriminatory behaviour due to new technical means and financial interests of providers

→ Transparent information needed concerning (unequal) handling of services or content

- No discriminatory behaviour allowed without ex ante publishing
- Discriminatory behaviour must be regarded as misuse and thus has to be sanctioned

Network Neutrality
Principle of free user access to the Internet and its services/applications/ content without restrictions or discrimination by the network access provider*

Demand for Quality of Service

Demand driven
Customer demand for preferred handling of data
e.g. VoIP, data centers

→ New business models arising based on service level differentiation
1) „Basic services" without discriminatory measures
2) Adjusted service offerings influenced by customer demand

- QoS must not have a negative impact on other services except explicitly requested by customer

* Unofficial consolidated Version of Framework Directive 2002/21/EC (ITRE Version) Art. 8, 4a.

4 Existing Investments

Regulation aimed at spuring new NGA investments has to take into account existing NGA investments in Europe.

NGA Deployment Projects

Several initiated projects in Europe, e.g.

Incumbents
- DTAG: VDSL
- France Telecom: FTTH Trial in Paris
- Telecom Italia: NGN**2**

Competitors
- NetCologne: Multikabel

PPP
- Breitbandinitiaitive Bayern

Regulatory Impact on Deployment

- Several NGA deployments are currently realized by private investors without being influenced or enabled by regulatory support

→ New regulatory incentives could affect those business cases

→ Market conditions seem to work mainly in metropolitan areas since private initiatives primarily address urban regions

- Deterioration of first mover's business case
- Affecting level of innovation
- Reduced incentives to invest

- Focus regulatory support for new NGA investment on areas where competitive investment does not work efficiently

5 Investment Uncertainty

New infrastructure investments require orientation about future regulatory conditions.

Long Term Investment Protection

- Deployment of new network infrastructure means high investments with long term returns
- Profitability of access not feasible from beginning
- Investments demand clear payback expectations

→ Access Directive 2002/19/EC with ITRE´s Amendments Art. 13 Paragraph 4 (a) puts out that *"regulation of access prices for long-term **risk-sharing** contracts are in line with the long-term incremental cost of an efficient operator, taking into account the operator's calculated rate of penetration of new markets and that **access prices** for short-term contracts include a **risk premium**"*[1)]

I

Passive measures

- Publish markets prone to regulation and regulatory measures early on
- Ensure transparency of incumbents' plans for NGN/NGA rollout to avoid stranded investments

II

Active measures

- Establish risk premium?
- Impose risk sharing?
- Determine suitable revision cycles
- Align regulation with market penetration and competition level reached

- Clear regulatory and market conditions foster investments
- Reduce investment uncertainty by passive and active measures
- Active measures have to be considered very carefully to avoid pitfalls of a planned economy

1) Unofficial consolidated Version of Access Directive 2002/21/EC (ITRE Version) Art. 13, 4(a).

6 Investment Sharing

Shared infrastructure development requires sophisticated approaches. Joint usage demands access to facilities.

		Challenges
Joint Investment	▪ Shared Investment between two or more competitors ▪ Voluntary ▪ Enforced by regulatory authority	**Different modes of operation**, e.g. ▪ Joint Venture ▪ Contract (duration, volume) ▪ Payment in Advance ▪ Risk premium **SMP considerations** ▪ Applicability of Antitrust Law? ▪ Reduced or increased SMP by joint provisioning?
Joint Usage	▪ Access to infrastructure and equipment, including wavelength and P2P fibre optics	**Third party access** → How to handle physical and virtual (bit-stream) access under conditions of regulated investment sharing?

I

Does shared infrastructure lead to collusive and potentially anti-competitive behaviour?
➔ regulatory oversight!

II

Will risk sharing and risk premium by law promote investment, and/or distort financial markets (e.g. risk premium versus capital costs) and hinder innovation?[1)]

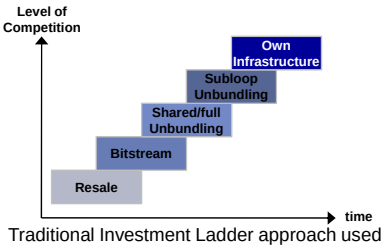
- Ensure that regulation of investment sharing is proportional and does not produce unintended consequences.

Source: 1) Unofficial consolidated Version of Framework Directive 2002/21/EC (ITRE Version) Art. 8, P. 4b and Art. 12, P. 2a;

7 Ladder of Investment

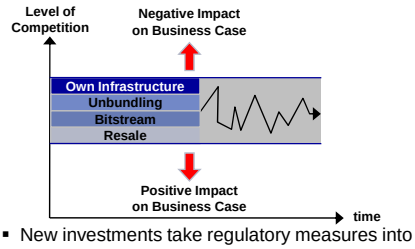
NGA with its new scale economies makes application of the Investment Ladder approach more difficult

Existing Infrastructure[1)]



- Traditional Investment Ladder approach used to transfer **existing**, monopolistic infrastructure into market competition
- Possibilities of realizing new economies of scale and scope are given, albeit limited

Future Infrastructure



- New investments take regulatory measures into account from the beginning
- Negative outbreak of corridor will have impact on business case, which will be anticipated and investment will not be realized

- Application of traditional Investment Ladder Approach will not work on new infrastructure not deployed yet
- Setting long term regulatory conditions from the beginning will provide safe environment for investments

Source: 1) Cave (2004), Vogelsang (2003)

8 Relevant Markets

Regulatory measures for markets 4 and 5 are to be enforced, if consistency with existing definition and SMP can be proven.

Relevant Markets

Fixed Location

Market 4

Wholesale (physical) network infrastructure access (including shared or fully unbundled access) at location.

Wholesale broadband access, comprising physical or virtual network access including `bit-stream` access at fixed location.

Market 5

Downstream

Applicability to NGA

Is “NGA physical access” different to “(physical) network infrastructure access”? Is „NGA” different to “broadband access”?

NO: Identical, as access independent of technology → 3 Criteria Test

YES: Major differences; why? → New Market Definition

- Market analysis with SMP test
- Substantially higher rural area rollout costs may imply definition and specific regulation of subnational markets.

Source: Commission Recommendation 2007/879/EC

9 Subnational Markets

For NGA different subnational regulatory regimes are required to cope with differences in metropolitan and rural areas

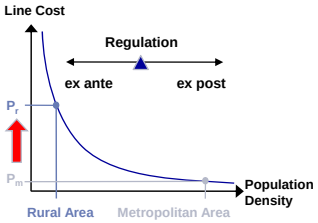
Situation

Metropolitan Broadband Coverage
- Private FTTx deployments in major European cities
- High availability of competitive offerings (e.g. cable, DSL, W…)
- Variety of passive infrastructural components (e.g. ducts,…)
- Sustainable competition level

Rural Broadband Coverage
- Limited access
- Often limited to one technology (e.g. DSL) with less capacity
- No existing NGA business plans

Digital Divide[1)]
- Increasing pace to two-tier society: online and offline
- Potential negative welfare effects for entire society

Subnational Markets



- Accept higher price level in rural areas (political issue)
- Ex ante regulation will be required in rural areas

I **Define subnational markets, accepting differential pricing**

II **Promote infra-structure rollout by government with specific means**

III **Fulfill Lisbon Strategy goals, with EU as knowledge based world leader**

- Define subregional and/or subnational markets
- Promote infrastructure rollout with e.g. specialized providers, PPPs, subsidies, regulatory support

Source: Lisbon Summer Summit Conclusion of March 2000; 1) Unofficial consolidated Version of Framework Directive 2002/21/EC (ITRE Version), Preamble

10 Universal Service

Universal Service Obligation is to be updated according to market conditions and could be used as additional measure for provisioning of NGA to rural areas.

Current Definition

- Currently 56 kBit/s are defined as Universal Service according to European Framework
- Exceeding that level via national implementation would result in financing via tax money
- New FCC Broadband definition describes „basic broadband“ with at least 768 kBit/s[1)]

Shorten Update Cycles

- Currently Universal Services are updated rather infrequently
- Setting fixed update cycles at ~ 3 years increases:
  - Investment incentives for private companies
  - Reducing probability of digital divide phenomenon

Universal Service

Upgrading existing Universal Service definition according to current broadband could result in private incentives to invest, using the German Universal Service approach

I Define minimum level of broadband

II Publish underserved areas & check development

III All providers >4% MS under obligation

IV Bidding contest for under-served area

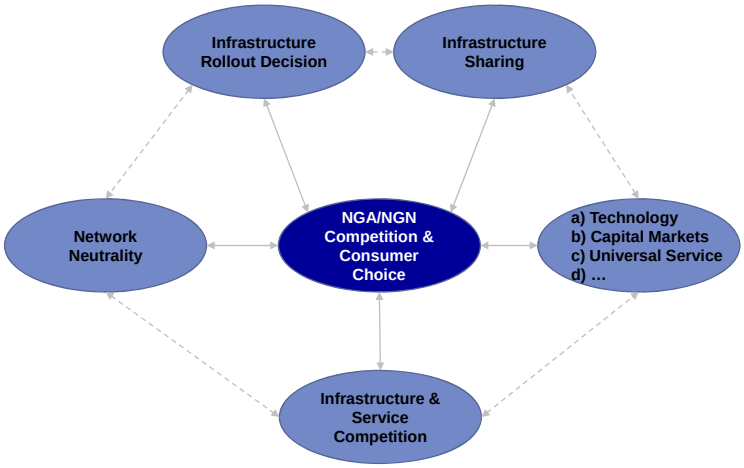
V Compensation for Universal Service delivery

Towards creating a “Race to Invest”

Source: §78 (1), §81 and§82 TKG (2004), 1) FCC (2008)

NGA Regulatory Ecosystem

Besides all granular regulatory approaches, interdependencies between and among regulatory measures may not be neglected.



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SAFEGUARDING COMPETITION AND CONSUMER CHOICE THROUGH REGULATION
INSTITUTE FOR INFORMATION, ORGANIZATION AND MANAGEMENT
PROF. DR. DRES. H.C. ARNOLD PICOT

THANK YOU!

Backup

NGA Regulatory Ecosystem (cont.)

Stakeholder analysis shows up clear interest in deployment of NGA, if participants are not discriminated in advance.

Stakeholder	Financial Interests	Network Coverage	Market Structure
Infrastructure Providers: Incumbents	▪ Profit Maximization ▪ Capital Market driven	▪ Business case driven ▪ Preserve market power	▪ Decrease Competition
Infrastructure Providers: Competitors		▪ Business case driven	▪ Easy and cheap access/provision
Service Providers	▪ Profit Maximization ▪ Capital Market driven	▪ Depending on total of network infrastructrue covered	▪ Non discriminatory access to network infrastructure
Regulatory Authorities / Government	▪ Fair wholesale/ retail pricing ▪ Investment Incentives	▪ Infrastructure Upgrades ▪ Universal Service provisioning	▪ Sustainable, efficient level of competition
(End-)Consumers	▪ Fair pricing	▪ Unrestricted access to infrastructure and services	▪ Free choice ▪ Range of competitive offerings
Capital Markets (Shareholder)	▪ Share value Maximization		

Regulation of NGA

Gabrielle Gauthey, Commissioner ARCEP

NGA Workshop

European Parliament

July 15th 2008

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Context

Access to civil engineering

Access to buildings

Sharing of the last part

Conclusion

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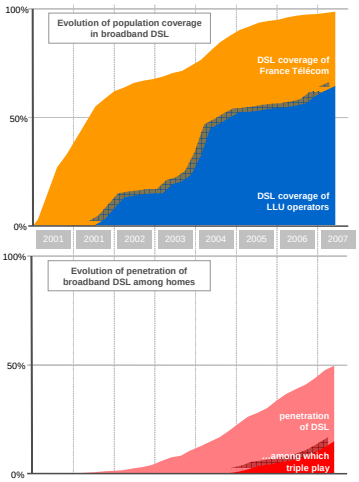
The regulation of broadband has encouraged investment by all operators

- Competition through infrastructures is the main driver behind the development of broadband:
  - the geographic extension of local loop unbundling has encouraged France Telecom to equip all of its MDF (Metallic Distribution Frames) for ADSL
  - France has joined European leaders in terms of penetration…
  - …and is in first place for "triple play"
- Regulation has made this increase in investments possible
  - local loop unbundling gives operators technical and economic control
  - "bitstream" serves as a geographic complement
- Municipal intervention assists this dynamic in low density regions



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Very high bandwidth opens a new investment cycle

- No doubt very high bandwidth is the technological evolution in the medium term
  - to meet growing demand for content
  - to assist the concomitant rise in speeds
- Major players have announced fibre deployments
  - with respect to other European countries, the challenge here is to bring the fibre as close to the subscriber as possible (right to the base of the house or building)
- Investments are significant and will need to be spread over several years
  - several hundred euros per connectable home
  - at a rate of one to two million homes per year
- The concern is to ensure that this investment is borne by all operators as much as possible

4

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Context

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5

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Alternative operators require access to civil engineering

- For an operator deploying a very high bandwidth network, access to existing civil engineering changes the economic equation considerably
- All operators are not on an equal footing:
  - alternative operators can roll out only in limited cases like Paris, where sewers can be visited and pass under every building
  - France Telecom deploys optical fibre in its civil engineering ducts inherited from the former monopoly
  - Numericable is progressively replacing coaxial cable with optical fibre
- France Telecom's ducts are an essential infrastructure
- Access to France Telecom's civil engineering must be guaranteed to allow all operators to invest

6

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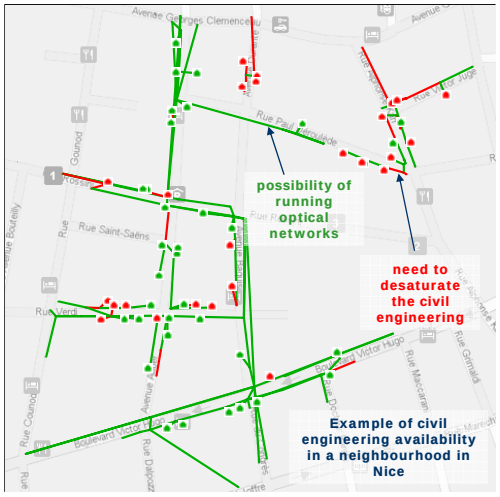
France Telecom's civil engineering has availabilities

- ARCEP has audited France Telecom's ducts in some ten cities
- The audit shows that civil engineering is available …
- …although availability is heterogeneous…
- …and will depend on engineering rules, in particular for desaturation



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Regulation of France Telecom's ducts has been initiated

- The regulation framework is that of the market analysis
  - to guarantee access to the essential infrastructure: France Telecom's civil engineering
  - the new Commission recommendation includes ducts regulation
- In its market analysis on broadband which has been notified to the European Commission, ARCEP has proposed to regulate the access to France Télécom's ducts.
- France Telecom has communicated its ducts offer to the operators
- Operators are experimenting the process of this offer
- ARCEP will make sure that all operators have access quickly to civil works under equivalent conditions. It requires:
  - an equivalent information on the availability of space
  - to use appropriate engineering rules that optimize the available space and the use of the ducts ;
  - to have a transparent, non discriminatory, cost oriented access to the ducts ;
  - to share part of the capital costs by coordinating work (by sharing studies for availability e.g.).

8

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Context

Access to civil engineering

Access to buildings

Sharing of the last part

Conclusion

9

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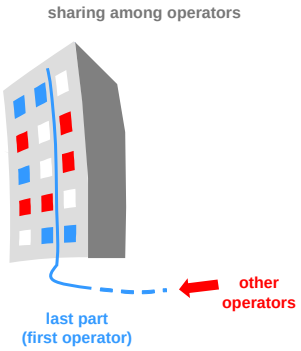
For all players, access to buildings is the main problem

- Fibre deployment to the home means that private properties have to be equipped
- Operators are prepared to bear the cost of this installation in the centres of major cities
- However, condominium owners, landlords and building managers fear that monopolies will be created by building or neighbourhood
  - they want to limit the number of agents in common areas…
  - …but want to be able to choose their operator, without having to move house
- So, sharing among operators is necessary
  - the first operator installs the fibre in the building then gives other operators access to its network
- In practice, operators have not yet applied sharing.



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Legislative measures are needed

- The current framework doesn't include sharing
  - Condominium owners and landlords can demand it from the operators contacting them…
    …but it is often difficult to establish the means or verify its application
- Regulation appears to be a relevant tool, which the law could assign to ARCEP
  - a law is under debate at the French Parliament
  - it requires operators to share the last part of their fibre network
  - it makes ARCEP responsible for defining clear means of sharing and guarantee operators respect them
  - this would be like extending "symmetrical" regulation (obligations applicable to all operators), which is currently limited to interconnection
- A balance can be found between operators' rights and obligations, so that fibre deployment in buildings can be simplified
  - extension of "antenna rights" extended to fibre
  - in new buildings, pre-equipment standards will have to be changed in the medium term

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Context

Access to civil engineering

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Sharing of the last part

Conclusion

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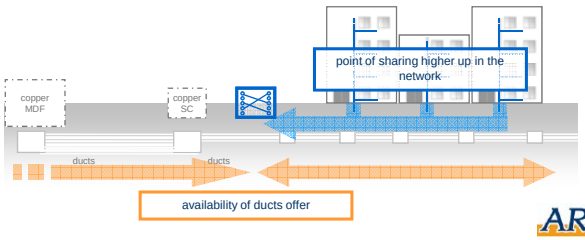
Means of sharing must encourage competition through infrastructures while tackling economical and operational concerns

- Sharing of in-house wiring at the level of the building and access to ducts alone will not be sufficient to guarantee sustainable competition, even in dense areas.
  - it is doubtful that there will be several rolls out until the base of each building on all the territory.
- The first operator rolling out fiber in an area will have to allow sharing, at some point higher in its network, which has to be chosen carefully, as it will determine the topography of the network for the following ones.
- ARCEP has put under public consultation last month several questions related to the role of the first operator within a building and the localisation of the point of sharing.
- The goal is to anticipate the “symmetrical” regulation framework and to provide guarantees so that fibre can be installed in buildings



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Conclusion

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The measure includes two tools, which can be adapted to market developments

- Two tools are needed
  - regulation of the ducts inherited from the former public monopoly, which concerns France Telecom ("asymmetrical" regulation)
  - sharing of the last part of the fibre networks, which concerns all operators ("symmetrical" regulation)
- A good balance needs to be found between encouraging investment and preventing the creation of local monopolies
  - the initial situation is different with respect to the regulation of broadband because France Telecom's dominant position is on the civil engineering and not on the local fibre loop
  - there is very little feedback from Europe, given France's head start in deploying fibre to the home

Regarding sharing of the last part, ARCEP will soon publish its conclusions of the public consultation and once the law is passed will take its first decision .

ARCEP will later evaluate these measures taking into account effective roll outs by the operators.

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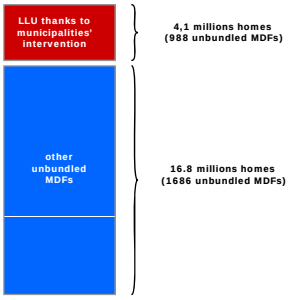
Municipalities can play a key role

- In recent years, municipalities have played a key role in the digital development of their regions
- Their intervention can be just as essential on very high bandwidth
  - by providing local information: site surveys and geographic information systems for public land
  - on civil engineering: by coordinating work, laying remaining ducts and authorising lightweight civil engineering
  - on the last part: with social landlords, by authorising wiring on facades and encouraging pre-wiring in new buildings and major renovations
  - cities wired under public service delegations have an essential asset for very high bandwidth

20,9 millions homes (64% of population) covered by LLU in June 2007



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Adequate intervention of local authorities is likely to facilitate the rolls-out

- Their role could be decisive:
  - avoid inefficient duplication of basic infrastructures (ducts, even fiber), which can be shared among operators
  - lays ducts and then rent them to operators
  - Have a lever effect on private investments
  - promote the choice of a common optical loop topography by operators
  - ensure the fair opening of the new optical loop

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Which incomes?
A winning relationship between content and FTTH

- Necessity to redefine the relations between operators, distributors and rights holders to develop a win-to-win relationship
- Very high speed opens up further opportunity to increase the value of contents (VOD,…)
- Needs:
  - to be able to have access to contents, in particular premium and sports programs
  - equitable additional incomes sharing
  - possible operators contribution to finance production

18

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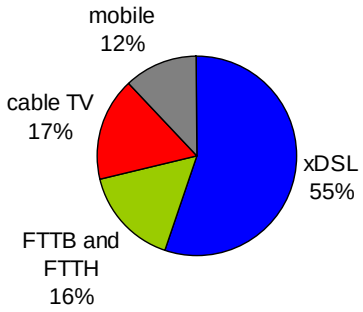
The NGA challenge – a regulator's view

Katarina Kämpe, Deputy Director General PTS

katarina.kampe@pts.se

Fixed and mobile broadband – shares on technical platforms in Sweden



Reach in share of households:

- xDSL 98 %
- Cable-TV networks 55 %
- FFTB (FFTH) 30 %. (In large extent in parallel with cable-TV networks).
- HSPA 80 %

2008-09-05

Two scenarios for future broadband competition

Today's regime:

- Parallel infrastructures of **different** technologies can supply customers with service substitutes (copper, fibre, wireless, cable TV). Regulation of incumbent.

Future scenario:

- With fibre access to end-users, competition has to be based on regulated open network access and bitstream in small and large access networks. Parallel fibre access networks to end-users will not be built.

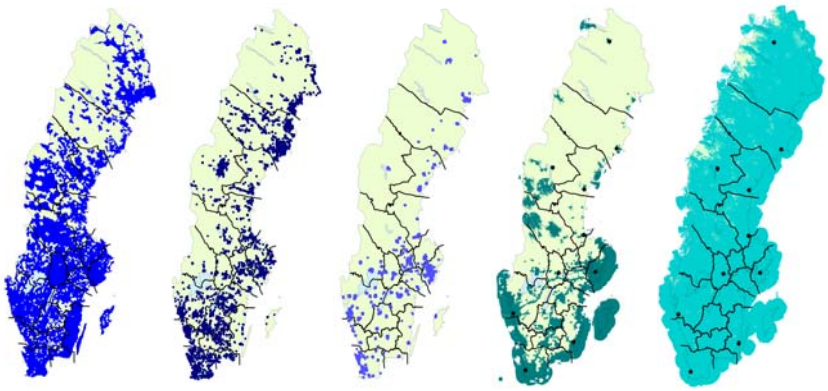
PTS 2008-09-05

A new European framework

- Regulatory framework that can achieve competition in both scenarios:
  - Parallel infrastructure based on different technology
  - Fibre infrastructure requiring e.g. open networks and bitstream access.
- Legal certainty and transparency – for both investors and competitors. Neutral incentives for investments in different technologies.
- Ensure removal of regulatory obstacles for investments (e.g. rights of way)

PTS 2008-09-05

Need for subsidise or USO in rural areas



xDSL | Fiber-LAN | Cable-tv | HSPA | CDMA 2000

PTS

2008-09-05

Conclusion: Need for an European NGA strategy

EU regulation must be transparent and balance needs for access regulation with the conditions to invest in NGA

- Access regulation will still be necessary – no ”regulatory holidays”.
- Price regulation may have to give more incentives for investments in NGA
- Transparency and non-discrimination obligations even more important – functional separation may be a necessary remedy
- Public funding necessary to reach rural areas – all technologies are needed

PTS

2008-09-05

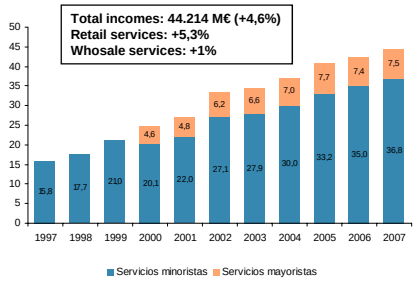
Regulation on a NGAN ENVIRONEMENT

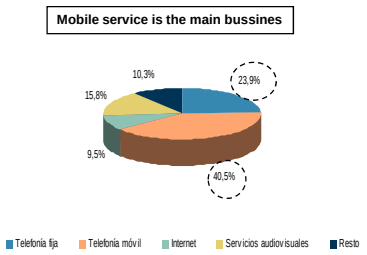
D. Reinaldo Rodríguez Illera
PRESIDENTE
Comisión del Mercado de las Telecomunicaciones

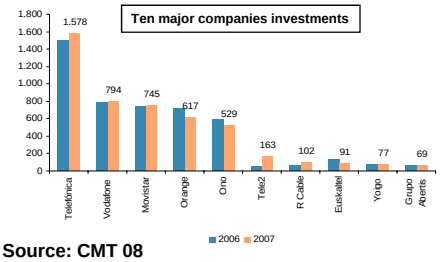
José P. González Rodríguez.
Member of the board. CMT

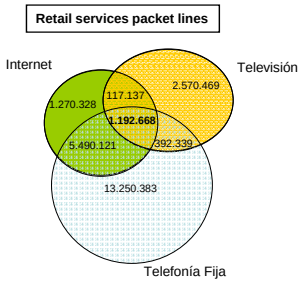
Workshop NGAN. ITRE. Brussels, july 08

Just a brief summary of the spanish market:





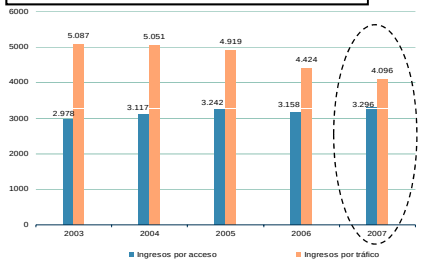




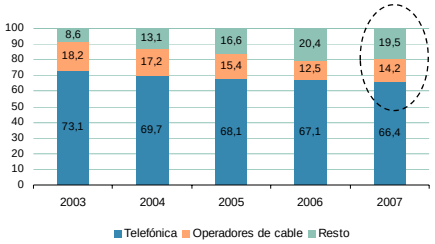
Source: CMT 08

brief summary of the spanish market:

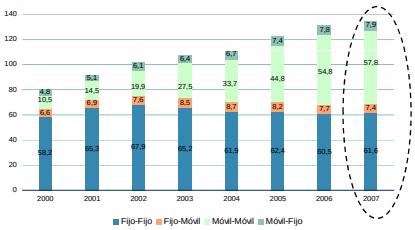
Fixed telephony: 44% of incomes comes from access.



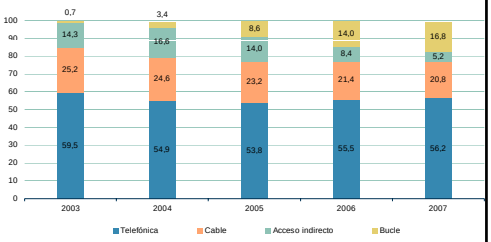
Fixed telephony: Traffic Market share



traffic (mM minutes): fixed – mobile sustitution grows up



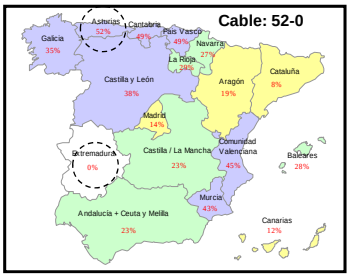
Broad Band market share (% lines)

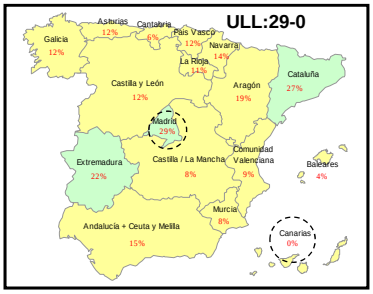


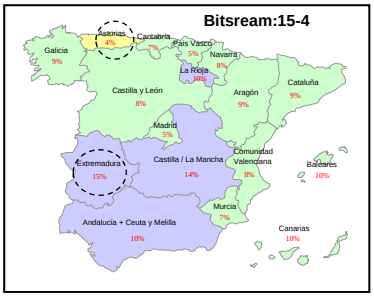
Source: CMT 08

Broadband market share (retail services)

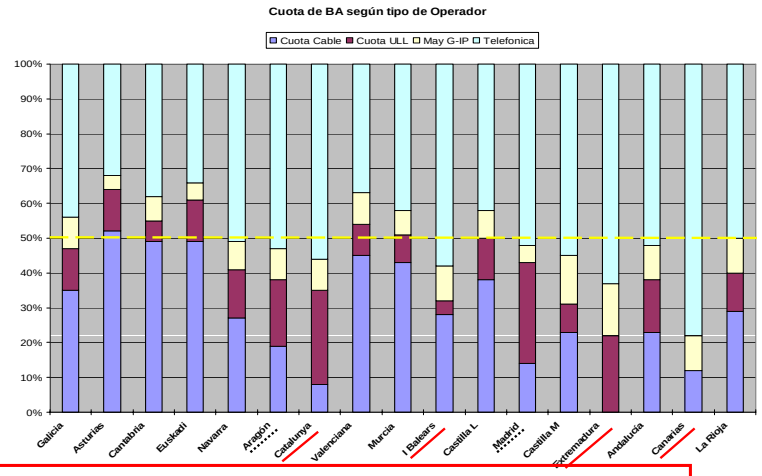
Source: JP gonzález







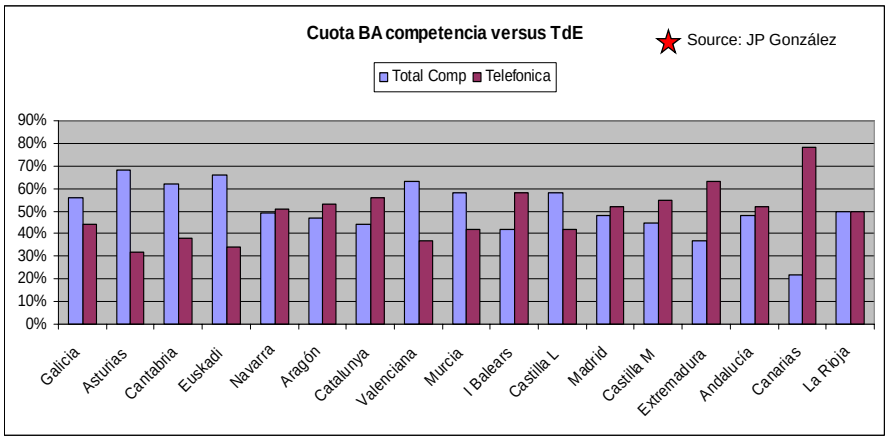
Source: JP González



Market preferences: 1st Cable; 2sc Telefónica; 3th ULL operators. Bitstream is the last option selected by the market.

5

Broadband market share: Telefónica versus Cable and ULL´s operators



Telefónica market share is between 35% and 78% depending cable operator development

¡Cable competition is the principal reason for Telefónica FO development!

6

Goals for NGA regulation

(English version of CMT's Guidelines at *www.cmt.es*)

- **Ensure sustainable competition**
- **Promote innovation & investment**

Need for a

REGULATORY BALANCE

Competition Protection ⟺ Investments Promotion

in order to **increase**

CONSUMER WELFARE

7

Tools for a NGAN regulation

Market analysis and remedies should consider the classical aspects, **but no only**

new elements have to been considered :

- The **availability of** copper based **legacy infrastructures**
- The **underlying passive infrastructure** (ducts, manholes,…)
- The **dependencies** between **retail & wholesale** markets.
- The **Geographical dimension** of market:
  - Dense areas vs. areas where only incumbent is present…
  - Need to analyze scope for :
    - **definition of geographical markets or**
    - **geographical differentiation of remedies**.

8

Retail access markets

% Households passed by cable

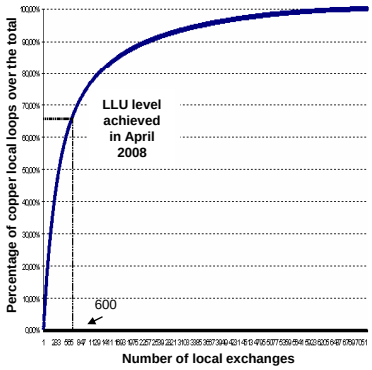
% lines in local exchanges with LLU

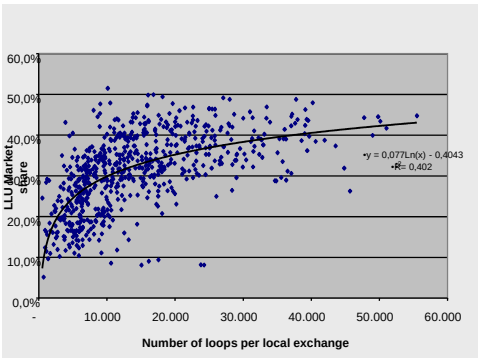
Although the development of cable and LLU is not complete homogenous. Is obvious that different geographical scenarios may be identified

Source: CMT

9

Wholesale access markets





A relatively low number of local exchanges reaches a coverage above 60% of total number of local loops.

The size of local exchange is one of the drivers for LLU operators´ investment decision, resulting into a positive correlation with respect to LLU operators´ market share

10

Access lines available (installed) and Access Lines in service

Cable operators in Spain, are really telecom companies. They start development their network in year 96-98.

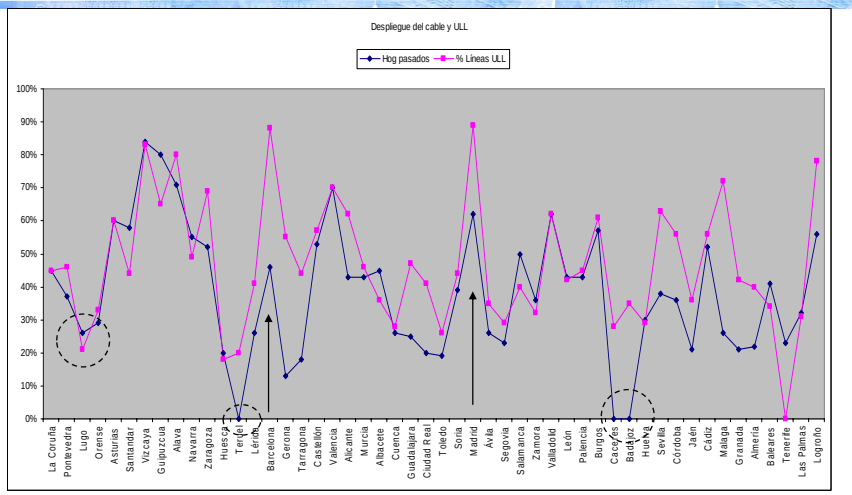
Nº de accesos instalados y líneas en servicio (2007)

	Telefónica	Cable	Resto	Total
Accesos instalados	16.656.062	8.109.584	162.546	24.928.192
Accesos en servicio	15.523.928	3.348.713	106.785	18.979.426

source: CMT 2008.

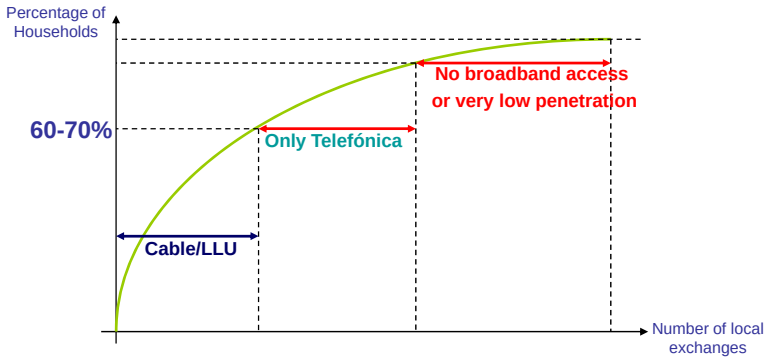
Source: CMT

Source: JP González



Cable and ULL development is quite similar.

Scope of access competition



The overlap between CABLE, LLU and TELEFÓNICA´S presence results into a relevant degree of potential or real access competition in around 70% of households

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C.M.T Guide Lines on NGAN Remedies

	Possible future approach to remedies	
	Competitive area	***Non-competitive area***
Local loop unbundling	Keep regulation; info needed of evolution of network	
Subloop unbundling	Keep regulation (but not a priority)	
xDSL Bitstream access at regional and national level	Possible fine-tuning of access obligation	Keep regulated access
Ducts and other passive infrastructure	Generic access obligations rather than detailed reference offer	
Fibre loop unbundling	Not considered; it would disincentive deployments	
FTTH Bitstream access	Regulated access with possible *"sunset clause"*	Regulated (for services not available on copper)

Indoor cabling	Ideally first operator present should be obliged to lease its indoor infrastructure: regulation under study.

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Interim measures ¿Why?

CMT has considered essential the immediate imposition of **interim measures over Telefonica** due to:

- Telefonica urgent plans and expected schedule to **launch commercial services** over fiber (FTTH)
- Importance of allowing third operators to plan in advance the deployment of **investment strategies**.
- Necessity that **early wholesale services** exist that allow operators to develop competing offers, thus make progress in the investment ladder.

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Interim measures ¿To Who?

- TO **all infrastructures** market players who will have **similar opportunity** for the deployment of services over fiber.
- To alternative operators who need respond early **to base fiver competition.**
- **While planning, negotiating and rolling** out its own infrastructure based on Telefonicas (or others) ducts, manholes, poles etc.

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Interim measures ¿ What?

Thus, a number of remedies are imposed to Telefonica, that will be in force until CMT completes the definition of markets 4 and 5:

- Obligation to provide **access to infrastructures** in the public domain (ducts, manholes, etc.)
- Obligation to provide **FTTH virtual access** in NGAN conveyance NODES.

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Interim measures (I)

1. **Obligation to provide access to infrastructures in the public domain (ducts, manholes, etc.)**

- To meet **reasonable requests** for access to infrastructure elements (ducts, manholes, etc.). *Agreements shall be met in 4 months*.
- **Cost-oriented prices**. **¿?**
- **Non-discrimination**, consisting in equal treatment of operators in access, and in offering services and access information on conditions not worse than applied internally.
- **Transparency** in access conditions: to provide information about infrastructures required by operators to design its access requests, in particular:
  - ***In one month*** after interim measures are in force, ***the list of NGN exchanges to be deployed until 2010***, together with its service area.
  - ***In two months*** after interim measures are in force, adequate information about infrastructures: *space availability in those ducts and manholes where Telefonica expects to deploy FTTH in the next 14 months*.
  - ***One year in advance to every fiber deployment***, adequate information about the affected infrastructures: **space availability** in ducts and manholes.

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Interim measures (II)

2. Obligation to provide FTTH virtual access in NGN exchanges

In NGN exchanges where an operator has required access to its associated infrastructure, Telefonica shall offer a FTTH virtual access subject to the following obligations:

- To meet **reasonable requests**, ensuring technical replicability of the FTTH network functionalities, thus allowing the provision of equivalent retail services (available in four months after interim measures are in force).
- **Reasonable prices**, avoiding margin squeeze practices.
- **Non-discrimination**, consisting in equal treatment of operators in access, and in offering services and access information on conditions not worse than applied internally.
- **Transparency** in access conditions: to provide information that allows operators to efficiently request wholesale services:
  - Estimations of the **expected coverage** achieved by NGN exchanges (e.g. passed homes); monthly updated.
  - **Buildings connected** with FTTH to every NGN exchange; daily updated.

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Thank you

Comisión del Mercado de las Telecomunicaciones

JRC EUROPEAN COMMISSION

Brussels 15 July 2008 1

Next Generation Access

Policy challenges and priority issues

Presentation for discussion at
ITRE Workshop
Next ("Now') Generation Access: How to adapt the electronic communications framework to foster investment and promote competition for the benefit of consumers?
European Parliament – Brussels 15 July 2008

Claudio Feijoo
Information Society Unit
Institute for Prospective Technological Studies – JRC

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Brussels 15 July 2008 2

Structure of the presentation

1. Ubiquitous next generation access: fiber and/or spectrum
2. The geographical dimension of next generation access
3. From regulation to policy
4. The regulatory trends and the new electronic communications framework

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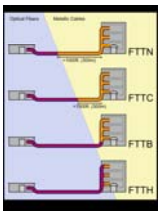
NGA: fiber and/or spectrum (I)

ipts Institute for Prospective Technological Studies

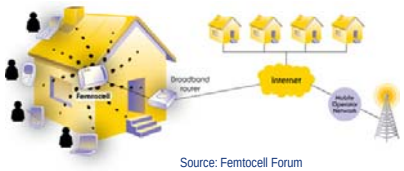
NGA techno-economic scenarios

+ fiber (FTTH)



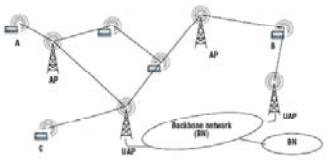
Source: Wikipedia

f-m convergence



Source: Femtocell Forum

+ spectrum (4G)



Source: IPTS

Evidences, policy challenges and priority issues

- The availability and **deployment** of techno-economic NGA solutions is, to a great extent, **independent of regulation**. The internal dynamics of supply and the evolution of demand will drive NGA deployment
- From an **infrastructure perspective** the main issues are **fiber deployment** investment/competition conditions and **spectrum management**
- Rapid **techno-economic evolution** avoids picking "winners". Product differentiation is the base for competition

Prospective consequences for discussion

- Regulation **influences** the pace of NGA deployment

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NGA: fiber and/or spectrum (II)

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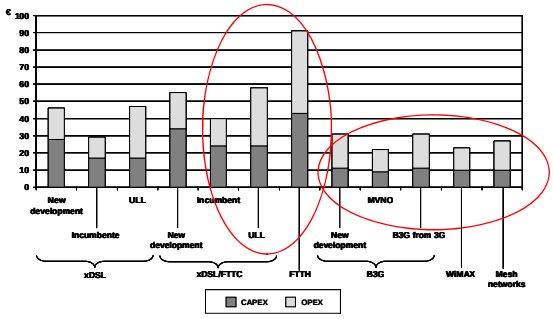

Comparison of costs of technologies for NGN access. Source: de Antonio, Feijoo et al (2005)

The **cost of the deployment** of such networks is in the same scale that today's broadband connection fees. For instance, Forge et al (2005) report for IPTS shows that "our simulation indicates **minimum** ARPU levels of 15-19 € monthly will be needed for 4G business cases to become viable …".

Evidences, policy challenges and priority issues

- Operators have **slowly started to invest** in NGA. **Fiber** (FFTH) roll-out is **delayed** in the EU with regard to USA and Japan/Korea. There are **credible** roadmaps for **4G** (LTE flavour) roll-out from 2010-11 onward.
- From 2010-11 onward there will more mobile broadband connections than fixed ones.
- Operators maintain their **doubts** about whether the applications and services offered over a NGN can provide a sufficient **return on investment** and, at present, they are not sure which killer application, if any, will provide new revenues stream

Prospective consequences for discussion

- NGA deployment **will take place**, but its pace will depend tremendously on (i) the departure point of the **operator**, (ii) the existence of **business models beyond** mere connectivity (operators' killer apps?, av content?, wholesale provision?, advertising?) and, as mentioned, (iii) on the **competitive – regulatory** framework

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Geographical dimension of NGAs

ipts Institute for Prospective Technological Studies

Expected levels of competition in geographical areas

A: high density urban – urban - suburban

B: suburban - rural

C: rural – remote rural

Evidences, policy challenges and priority issues

- Areas type A: Competition "level-3" (fixed + cable + bb mobile + others) to "level-2" (fixed + bb mobile)
- Areas type B: Competition "level-1.5" (fixed + mobile)
- Areas type C: Competition "level-1" (fixed universal service / mobile) to "level-0"

Prospective consequences for discussion

- Level-3: withdraw ex-ante regulation for NGA, but don't forget high quality spectrum … natural oligopolies?
- Level-2: new ex-ante regulation for NGA/broadband access to become level-3: rights of way, ducts, …, functional separation?
- Level-1.5: key role of spectrum management to become level-2
- Level-1 and level-0: new universal policy tools

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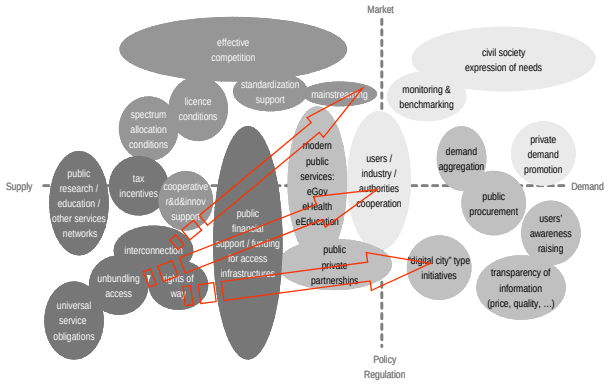
NGA: from regulation to policy

ipts Institute for Prospective Technological Studies



Policy tools related with universal service objectives.
Source: Milne and Feijoo (2008)

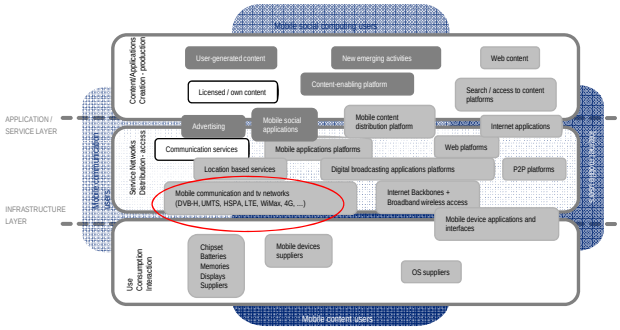
Evidences, policy challenges and priority issues

- Evolution of policy tools from supply to demand and from strong regulation to market-light touch
- Appearance of new policy tools, e.g., public-private partnerships

Prospective consequences for discussion

- A coordinated policy approach encompassing a larger array of policy initiatives (at least both supply side and demand side oriented) will have a greater chance of success than just a sole policy tool

NGA: the regulatory trends



Map of techno-economic activities in the mobile content ecosystem. Source: IPTS (2008)

Evidences, policy challenges and priority issues

- A complex ecosystem where NGA is a key piece … among many others. Shift to the edges in relative importance

Prospective consequences for discussion

- The new electronic communications framework will not be the ultimate framework, but the last with main focus on infrastructures … although some form of infrastructure regulation will subsist
- Existing trends: (i) less regulation, (ii) retail to wholesale, (iii) ex-ante to ex-post, (iv) convergence
- New trends: (i) efficiency first then competition, (ii) regulation of services not technologies, (iii) targeted policy actions – new tools, (iv) consumer safeguards, (v) issues on vertical integration – media concentration

Next Generation Access

Policy challenges and priority issues

Presentation for discussion at
ITRE Workshop
Next ("Now') Generation Access: How to adapt the electronic communications framework to foster investment and promote competition for the benefit of consumers?
European Parliament – Brussels 15 July 2008

Claudio Feijoo
Information Society Unit
Institute for Prospective Technological Studies – JRC

ANNEX II: SPEAKERS' BIOS

Ms Claudia Sarrocco

Claudia Sarrocco works as a communication analyst at the OECD. She analyzes trends in information and communication technology, policy and market structure. Her recent research has focused on convergence and the emergence of next generation networks.

Before joining the OECD, Claudia worked as a policy analyst for the International Telecommunication Union in Geneva. Claudia holds a degree in Law from the University of Milano (Italy), and an LLM in International Law from McGill University in Montreal (Canada). Claudia was admitted to Milan Bar in 2004.

Prof. Martin Cave

Martin Cave is Professor and Director of the Centre for Management undr Regulation at Warwick Business School, University of Warwick, UK. He is a regulatory economist specialising in the communications sector. He is co-author of 'Essentials of Modern Spectrum Management' (2007) and co-editor of 'The Handbook of Telecommunications Economics' (2002, 2005). He has consulted widely for regulators in several member states and for the European Commission.

Prof. Dr. Dres. h.c. Arnold Picot

Arnold Picot is Professor of Business Administration at the Ludwig-Maximilian University (LMU) Munich and Director of the Institute for Information, Organization and Management (for further details see http://www.iom.bwl.uni-muenchen.de/index.html). He has taught at universities in Germany (Leibniz University Hannover, Technical University Munich, Ludwig-Maximilians University Munich), Switzerland (St. Gallen), France (Strasbourg) and the United States (Stanford, Georgetown). His research focuses on the interdependencies between information and communication technology on the one hand and organizational and market structures on the other. He has published numerous books and papers dealing with market development and regulation, organizational design, information and communication technology, evolution of new organizational forms, including topics such as office communication, electronic data interchange, telecommunications, new media, electronic markets and virtual organizations (list of publications can be found at http://www.iom.bwl.uni-muenchen.de/forschung/veroeffentlichungen/index.html).
His academic work is complemented by various research and consulting projects in the industry and the public sector. He holds several editorial positions and is a member of the Bavarian Academy of Sciences. He is a chairperson or member of numerous scientific advisory boards including Federal Network Agency (Bundesnetzagentur), Zentrum für Europäische Wirtschaftsforschung (ZEW), Deutsche Forschungsgemeinschaft (DFG), the Munich Circle – Supranational Association for Communications Research (Münchner Kreis), Wissenschaftliches Institut für Infrastruktur und Kommunikationsdienste (WIK) as well as of several boards of directors and supervisory bodies in academia and industry.

Ms Gabrielle Gauthey

Gabrielle Gauthey is member of the Board of the French Regulatory Authority for Electronic Communications and Posts (ARCEP) since January 2003.

Gabrielle Gauthey, is a graduate of the Ecole Polytechnique and holds a postgraduate degree in economic analysis. She began her career with France Telecom and joined DATAR in 1992 as head of the foreign investment department in France and as General Secretary of the

"Invest in France" network. From 1995 to 1997 she worked at the office of the Minister for Posts, Telecommunications and Space Affairs as a technical adviser on telecommunications and information technologies. From 1998 to July 2000 she was Deputy Director-General of Sofirad and Director-General of "Le SAT", the first satellite-based operator of French-language digital TV and radio services in Africa. Till January 2003, she was Director of the Information and Communication Technologies Department at the Caisse des Depots et Consignations, responsible for investment in the" regional digital development" programme by mandate of the state.

Ms Katarina Kämpe

Katarina Kämpe, Deputy Director General of the Swedish Post and Telecom Agency.

Katarina Kämpe is Director of Strategic Affairs Department since 2007 and prior to that she held the position as Director of Information Department (1999-2007).

Previously she was Director of Public Relations at the Swedish Armed Forces' HQ and prior to that she held the position as Project Manager at the PR agency Florman Information AB, affiliated to Edelman Public Relations World Wide.

Katarina Kämpe has a Bachelor of Science (studies in communication science, political science, statistics, psychology and sociology) at the University of Växjö and studies in Swedish at the University of Stockholm.

Katarina Kämpe is a member of the board of:

- The Swedish Rail Administration

- The Swedish Data Inspection.

Mr José Pascual González

Member of the Board of CMT ("Comisión del Mercado de Telecomunicaciones de España") since December 1999 until present.

Holds a degree in Advanced Telecommunications Engineering from the School of Madrid, and also attended a Foreign Trade Course, Law of Competencies at the IESE School of Business and has a Master's Degree in Marketing and International Trade. Advanced Competition Policy Programme; legal and economic aspects, Business Institute of Madrid. He started his professional career in 1979, in the company SINTEL, as Telecommunications Project and Systems Engineer. In 1983 he joined the Computers Division of Telecommunications, together with the TESYS programme X.25. In 1994 he was appointed Sales Director of *Radiored S. A.* a company belonging to the *Telefónica Group*, and operator of the Public Radio Telephone Service in Trunking, until he was appointed Director of *Telefónica Servicios Móviles* in the Canary Isles in 1996. In 1997 he becomes a Telecommunications and Information Society Advisor to the President of the Regional Community of the Canary Isles until 1999 when he was designated Territorial Director of *Telefónica de España* in that Region.

Mr Claudio Feijoo

Claudio Feijóo holds a MSc and PhD in Telecommunication Engineering from Universidad Politécnica de Madrid, Spain. Currently, he is working at the Institute for Prospective Technological Studies of the JRC of the European Commission where he researches on the future socio-economic impact of emerging information society technologies. He is professor (on leave) in the Universidad Politécnica de Madrid, where he directed the Chair in Telecommunications Regulation and Information Society Public Policies. He was also adviser for the Spanish State Secretary on Telecommunications and Information Society, participating in the design of information society development plans and broadband deployment strategies. For three years, he was the CEO of GTIC Telecom, a university spin-off devoted to the transfer of know-how in technology, media and telecommunications. He has been involved in numerous research and development, public and private, projects in Spain, Europe, LatinAmerica and North of Africa. He is particularly proud of the project for electronic communication sector development he conducted for the EU in Latvia. He lectures regularly in seminars and postgraduate courses and has authored many publications in journals and conferences.