The Economics of Next Generation Access Networks and Regulatory Governance in Europe: One Size Does not Fit All

by

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I. Introduction

Many Europeans incumbents and some alternative operators are starting to plan and in some cases deploy large scale fibre investments, resulting in significative changes for European fixed line markets. The technologies used and the pace of development vary from country to country according to existing networks and local factors. Currently, the incumbents' preferred choice is FTTCab (fiber to the street cabinet) while the alternative operators' choice is FTTH (fiber to the home), bypassing completely the incumbent's network. The outcome of this battle is difficult to predict but the transition from broadband to very high-speed broadband will have definitely important consequences for industry, operators, local governments as well as the competitiveness of our nations.

The 12th Implementation Report on European Electronic Communications Regulation and Markets 2006 emphasizes the enduring positive results from the European Regulatory Framework in terms of competition, investment (Europe invested in 2006 more than 47 billion euro, more in absolute terms than either the US or Japan), broadband penetration (7 European countries are ahead of the USA in broadband penetration and Denmark & the Netherlands are ahead of Korea, world leader in broadband) with resulting benefits to consumers in terms of prices and innovative converged services.

However, European incumbent operators are asking for new rules to be able to recover their investments in next generation networks and regulators are concerned that the new infrastructures may create new monopolies at the access level[3]. As suggested in Williamson (2007) there are two reasons why the investment in Next Generation Access Networks (NGAN) is particularly risky:

1) These networks require a large up-front investment ahead of demand rather than incrementally in response to demand ;
2) Investors tend to evaluate telecoms investment assuming no revenue uplift from new services will be available, but only cost savings from the adoption of the new technology.

At the same time, regulators share the view that "*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….NGA may be likely to, at least, provide the same competition challenges to regulators as current generation wireline access networks*"[4].

This paper examines the mix of technical, regulatory, and business strategy issues that arise in implementing in Europe next generation broadband platforms. While the conclusions in terms of market structure are likely to differ market by market, our analysis suggests that the traditional "One size regulation fits all" approach is not going to work in Europe. In fact, although we do not think that fibre in Europe will follow the US example - the forbearance model - we strongly believe that regulation will need to be made more flexible. If promoting facilities-based competition is the goal, to assure a reasonable return on investment and guarantee fair competition **it is necessary for regulation to adopt a case by case approach to regulate access** (Dasgupta & Waverman, 2007). Based on the different underlying cost conditions of entry and presence of alternative platforms, it may be more appropriate to **geographically differentiate the access regulatory regime**. Geographic markets

[3] See, Global Telecom Business (2007) "Fibre, a breakthrough but a danger of a new monopoly" , January/February
[4] ERG (2007) pag . V

characterization should start with an assessment of the existing competitive conditions at the local level including, where appropriate, local exchanges. This approach will allow to focus on the existing degree of Local Loop Unbundling (LLU) competition as well as to point out the existence of intermodal competition at the local level. Essential facilities test and competition-specific considerations can help in triggering the geographically different regimes: forbearance where competition is feasible, sunset clauses, mandatory unbundling and bitstream can offer the right mix of incentives to the different industry players.

The balance of this paper is organized into four sections. Section II, using some business case studies, discusses in more detail the economics of Next Generation Access Networks (NGAN), the need for a more flexible approach to deployment of these networks and why the idea that each player can choose a different technology and architecture to fit its need is at the heart of NGAN development. Furthermore, this section presents ad hoc geographic cases to show why geography matters in defining the right regulatory framework to guarantee efficient investment and development of competition. Section III provides an overview of the current European regulatory practice on geographic markets, using the body of knowledge on geographic markets from the European New Regulatory Framework and the recent regulatory experiences in the definition of geographic markets in some countries such as UK, Spain and Italy. At the same time, this section suggests how to shape regulatory policies for NGAN using the geographic dimension of the market definition in an NGAN framework. Section IV concludes.

II. The economics of NGAN

In this section we present the economics of next generation access networks, focusing on the most used wired network solutions (Fiber to the Cabinet and Fiber to the Building/Home) and explaining why these architectures call for a very flexible approach to their deployment based on geography, competitive situation and business solutions. Furthermore, we discuss the different solutions that these new networks suggest to incumbent and alternative operators to compete in the broadband market. We then examine the development of NGAN through ad hoc case studies, such as Milano in Italy. We suggest that the already existing vigorous intermodal competition in areas such as Milano and the potential boost on infrastructure competition that the development of NGAN could generate imply the need for a much more flexible approach to access regulation than what has been pursued so far in Europe.

A. NGAN architectures

The introduction of Next Generation Networks (NGN)[5] sets the stage for a new era in the communication sector. NGN represent a profound revolution where the electronic communications market becomes heavily integrated with information society services with far reaching implications for network architectures, market development, and the need for new approaches to policy and regulation.

[5] A "Next Generation Network (NGN) is a packet-based network able to provide telecommunication services and able to make use of multiple broadband, QoS-enabled transport technologies and in which service-related functions are independent from underlying transport-related technologies. It enables unfettered access for users to networks and to competing service providers and/or services of their choice. It supports generalized mobility which will allow consistent and ubiquitous provision of services to users".- ITU – T Recommendation Y.2001

However, for the purpose of this paper, the analysis of NGN will be limited to the current and future developments of network architectures in the local loop, i.e., Next Generation Access Network (NGAN). In the last few years, all major telecom operators have started trials or deployment of new access network architectures. This behaviour can be explained by the need to develop new services to generate new sources of revenue to recover the losses from traditional voice services, to face network obsolescence and reduce operational expenses, to better compete with old and new players (such as Google), to handle the physical saturation of the copper broadband network and to exploit the availability of new network solutions at standards ITU-T such as VDSL2 and GPON.

Although a NGAN can be made of fiber, copper utilizing xDSL technologies, coaxial cable, powerline communications, wireless solutions or hybrid deployment of these technologies, we will focus on wireline access networks, where the current and planned effort of incumbents and alternative operators is concentrated on and regulators' attention is directed to. Actually, the timing and the choices of specific technologies for NGAN may vary between countries, from geographic area to area and from operator to operator. This variation depends on a plurality of factors including state and age of existing network infrastructure, length of local loop, population density and structure of the housing market, distribution of number of users and number of street cabinets for Local Exchange, level of intermodal competion in the market, willingness to pay for broadband services and the existence of *ad hoc* national government plans for broadband development.

Therefore, the idea of flexible solutions to NGAN, i.e. that each player can choose a different technology and architecture to fit its need, seems to be at the heart of NGAN development.

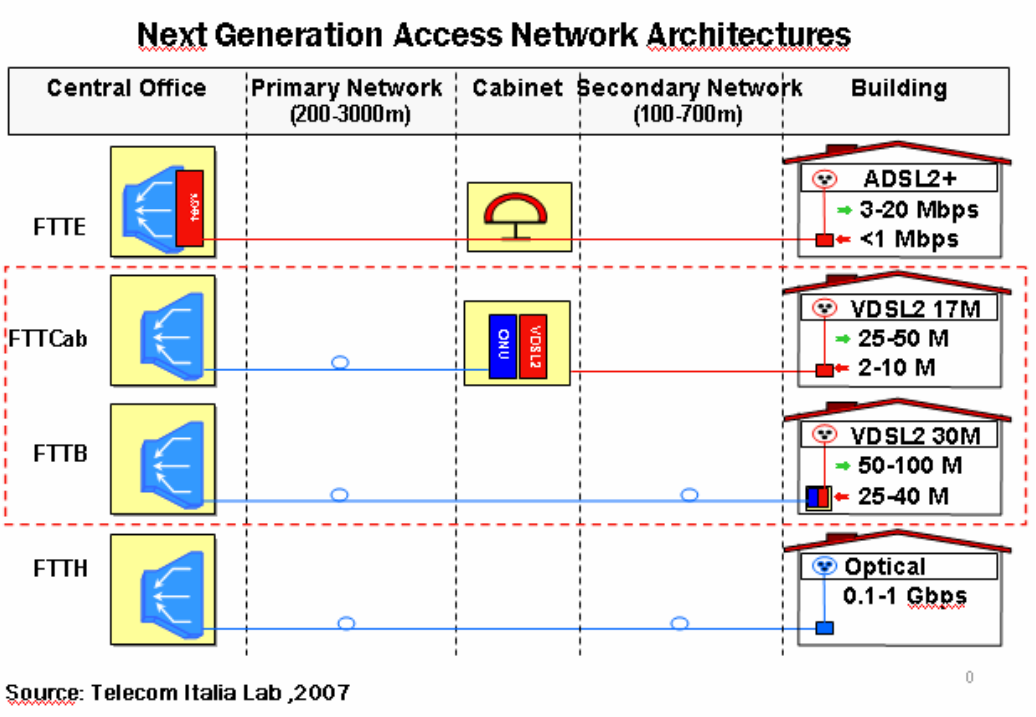
Actually, the limits of the single, uniform architecture approach are well known in the literature since the late 90s. [6] In fact, the single technology solution - in the way over the last century twisted copper pair dominated the telephone network and the coax cable dominated cable television - was based on the old paradigm that maximizing network efficiency will automatically maximize customer value. Today, this approach is challenged by different factors:

i) different carriers may have different strategies;
ii) there is a much higher level of technological uncertainty associated with the new architectures than in the past;
iii) there is a different evaluation among carriers of the technology evolution;
iv) competition is expected to take different forms;
v) the market appears to be fairly segmented by a range of services and willingness to pay for them.

Figure 1 presents the wireline next generation access networks architectures to bring broadband services to customer premises.

[6] See on this L. Pupillo & A. Conte, 1998, The Economics of Local Loop Architectures for Multimedia Services Information Economics and Policy 10 (1998) 107-126

Figure 1



Fiber to the Exchange (FTTE): this solution uses the current copper network in both the primary and the secondary distribution network. It is based on the ADSL2+ technology and an optic fiber from the Central Office to the transport network. It allows for broadband connections up to 20 Mbit/s downstream and up to 1 Mbit/s upstream. It is recommended for low densely populated areas.

Fiber to the Cabinet (FTTCab): this solution uses fiber from the central office to the street cabinet and copper from the cabinet to the customer premises. It consists of a new cabinet containing the Optical Network Unit (ONU) serving few hundreds lines and including the VDSL2 apparatus. The ADF (Automatic Distribution Frame) to switch the services on from distance. It allows for downloading capacity up to 50 Mbit/s and uploading up to 10 Mbit/s at distance up to 700 meters.

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Fiber to the Building (FTTB): this solutions uses fiber from the central office to the building. It consists of smaller Optical Network Unit (ONU) (serving dozen of lines) including the VDSL2 modem to connect the fiber to the copper network of the building. It allows for downloading capacity up to 100 Mbit/s and uploading up to 40 Mbit/s at distance up to 200 meters.

Fiber to the Home (FTTH): this solution uses fiber from the central office to the customer premises and bypasses completely the copper network. It does not require any new cabinet**.** It allows for symmetric capacity up to 1 Gbit/s.

B. Cost drivers of NGAN

We will focus our attention on the FTTcab and FTTB/H architectures because they appear to be the most relevant cases in several European countries. Many factors and parameters constitute cost drivers for these architectures. The following broad cost categories can be distinguished:

- Infrastructures
- Electronics
- Customer Premises Equipment

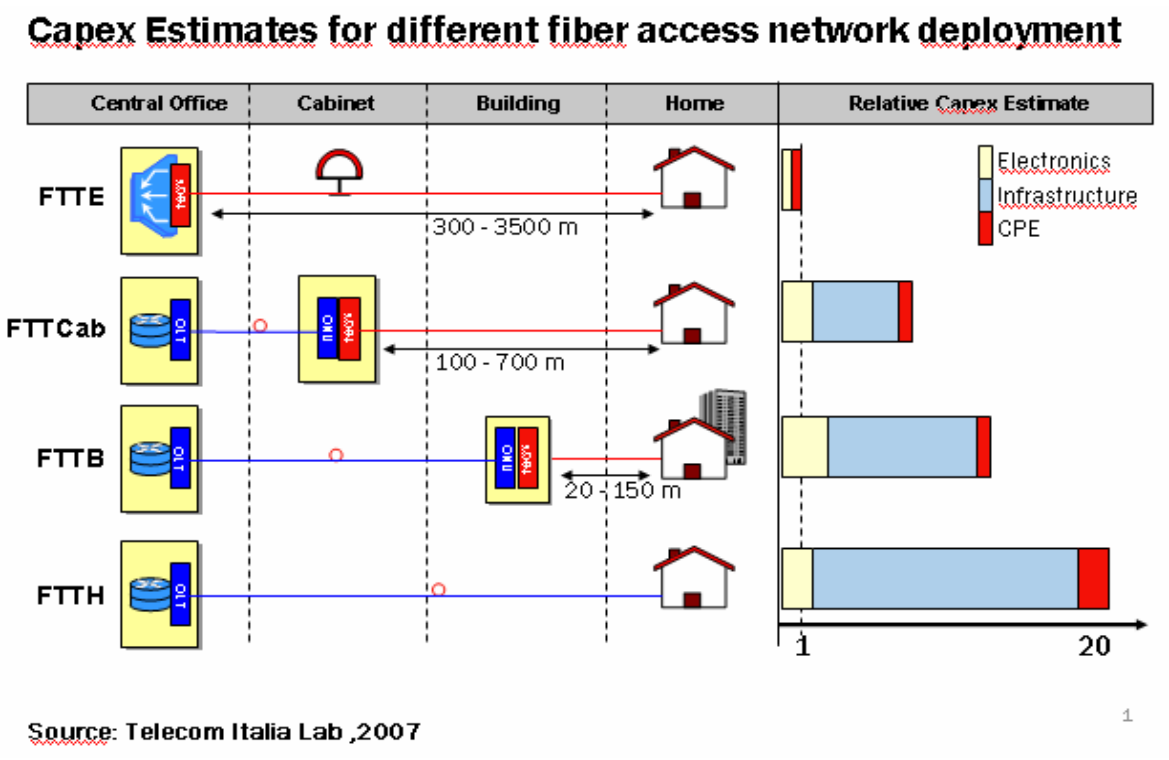
Infrastructures: it includes the (horizontal) trenching and ducting and fiber cabling deployments and (vertical) costs of in-house wiring for the FTTH solution. It encloses the cost of the splitters. For the FTTcab solution the fiber costs are relevant for connecting street cabinet to the Local Exchange. They are even more important for FTTB/H scenario as fiber is brought up to the building. Different studies assume these costs to be between 50 % and 80% of the total costs per customer depending on the population density (ARCEP, 2006; JP Morgan, 2006). The ducting costs depend to a large extent on the usage of existing infrastructure such as trenches or ducts. In the situations where the existing narrowband or broadband or other utilities infrastructures can be used, these costs can be dramatically reduced.

Electronics: it includes the equipment costs such as ONU. For the FTTCab case also the cost of the cabinet. These are "fixed cost" per street cabinet and need to be recouped per line. The number of clients reachable per street cabinet plays a major role.

Customer Premises Equipment (CPE): it includes the modem, and all the electronics at the customer premises. In fact, for the FTTH solution the CPE cost includes the ONU itself that is placed at the customer premises.

Figure 2 presents the relative estimates of capital expenditures for the deployment of the different fiber access architectures.

Figure 2



Comparing the cost per line of the current solution (FTTE) with the others architectures, the FTTCab architecture costs 7-8 times more than the FTTE, the FTTB 12-13 times and FTTH about 20 times more than the FTTE. Beside the relative different weight of the electronics and CPE, it is clear the major role played by the costs of infrastructure.

C. Incumbent vs. alternative operators' architectures choices

Given the described cost structures, how the incumbent and the alternative operators are positioning themselves? The "Fiber Battle" report by JP Morgan (2006) emphasizes that incumbents and alternative operators in Europe have launched large scale fiber deployments. The majority of incumbent are choosing FTTCab; the alternative operators' choice is FTTH in largely populated areas, bypassing completely the incumbent network. Some operators, such as Telecom Italia, are choosing both FTTB and FTTcab solutions in different cities or even in different areas of the same city.

There are three reasons for incumbents to roll out FTTCab:

- Revenue Upside: Incumbents believe that the superior capability of VDSL2 will allow them to charge premium prices.
- Cost saving from reduction in operating expenses and from the planned closure of many central offices when the VDSL network is completed.
- Strategic evaluation: deploy VDSL2 is a rational way to face competition from cable companies and defend market share against triple play cable offering.

The JP Morgan's report while suggests clearly that the VDSL2 solution changes today's LLU paradigm, it calls also for new choices from LLU operators. In fact, it shows **that there is a FTTH business case for alternative operators** in Europe's metropolitan markets, as demonstrated by Iliad in France and NetCologne in Germany. Table 1 shows the major components of Iliad's and Net Cologne's FTTH.

Table 1 : Iliad's and NetCologne FTTH projects' major components

- Iliad aims to cover 4m metropolitan households, NetCologne (NC) 400,000
- Iliad expects to spend Euro 1bn to connect an expected 20-30% of households, NetCologne an estimated Euro 150m to connect 40% of these households, amounting to around Euro 1,000 per household in each case.
- Both operators target paybacks of around 6 year and achieve their payback due largely to lower payments to the incumbents (LLU costs)
- Both operators intend to offer wholesale access to their FTTH network
- Both operators benefit from some privileged access to ducts (NC with 1,000 km fibre in Cologne and access to parent ducts, Iliad with access to Paris sewers)

Source: JP Morgan (2006)

In these cases, where alternative operators have sufficient market share and **access to infrastructure** (ducts from the municipalities), payback of six years or less can be justified without assuming market share or ARPU gains. We mentioned before, that infrastructures costs play a significant role in explaining the costs differences among the various access networks architectures. The JP Morgan report estimates that assuming a reduction of 50% duct and building related costs would lower the per

customer connected cost from euro 2.500 to euro 1.500. Therefore, the payback for a 25% market share operator (without additional ARPU or market share increase) would decrease from 16 years to 10 years. At 40% market share, the Net Cologne case, the payback would be reduced to 6 years.

The importance of sharing infrastructures it is also supported by ARCEP (2006) in the FTTH case study for the City of Clermont-Ferrand, where access to a network of ducts covering the whole city brings the coverage by a private operator from 1% to 21% of the area, and from 1% to 79% of all households.[7]

These studies show that the availability, in specific geographic areas, of existing infrastructures such as ducts or fiber can make viable even the most costly fiber access network solutions and call for a **much more flexible approach** from regulators, based on the understanding of the different technologies solutions available, the level of infrastructure competition already in place especially in metropolitan areas and the diverse geographic market conditions in order to limit the potential regulatory intervention only to *enduring economic bottlenecks*. [8]

To complete our review of solutions for NGAN players, it is worthwhile to mention that Analysys (2006) in an ad hoc report for OPTA, emphasizes that subloop unbundling for VDSL solutions to around 1000 of the largest street cabinets in the dense urban areas in the Netherlands, may be economically viable for an alternative provider with 10% market share under some specific circumstances related to SLU tariffs and reasonable expected ARPU increase.

D. NGAN in Italy: where geography matters

Telecom Italia (TI) on March 9th 2007 announced, in a meeting with the financial community, its plans for network evolution. The current TI network status in Italy is characterized by a physical saturation effect (the broadband lines to copper cable lines ratio is close to its physical upper limit (50 to 60 %)), increasing capital and operating expenses in order to face network obsolescence and inertial evolution and lack of enough bandwidth for launching future bandwidth hungry services (media, ICT..).

Therefore, TI Next Generation Access Network projects aims at fully migrate the current network to a broadband network which allows for more than 50 Mbit/s on fixed infrastructure and 10 Mbit/s on mobile. Furthermore, TI would like to massively introduce Fibre (FTTx) in the access network and to install VDSL2 technology (up to 65% of population coverage) and to implement a "Full IP" network. The benefit from this plan will be multifold:

- aavailability of much more bandwidth for new services (>50Mbit/s);
- strong reduction in network fault rate;
- future-proof infrastructure to accommodate next generation technologies;
- strong reduction in Network CAPEX-OPEX (over 1 Bln Euro) thanks to:

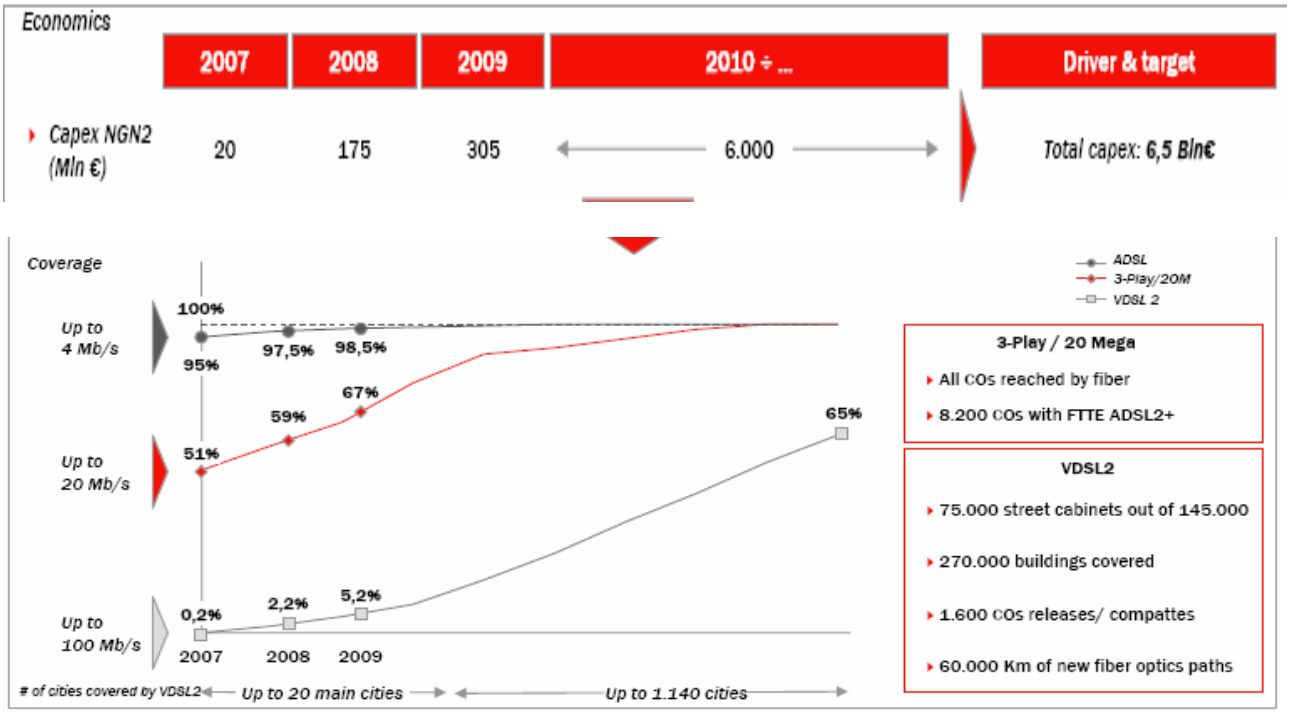
[7] ARCEP just launched a consultation on the evaluation of competitive access to ducts. http://www.arcep.fr/uploads/tx_gspublication/consult-ftth-fourreaux-juillet07.pdf

[8] Ofcom in its Strategic Review of Telecommunications defines an "*enduring economic bottleneck*" as the part of a network where the economics of alternative offerings are such that competition, through further market entry or innovation, is very unlikely to emerge in the relevant time horizon.

- Network architecture simplification and reduction in the number of central offices and related leases.
- Elimination of traditional switched networks over time and resolution of obsolescence issues.
- Simplification/greater automation of maintenance, provisioning and assurance**.**

Figure 3 shows the economics and the coverage of Telecom Italia's NGAN.

FIGURE 3: TI NGAN ECONOMICS AND COVERAGE



Source: Telecom Italia, 2007

Total project capex is around 6, 5 Bln €. The project will be almost "self-financed" since the investments in NGAN will not generate an increase in total capex through progressive traditional-to-innovative capex substitution and major opex reduction in real estate, site rental, operations and energy saving. About 65% of the lines will be covered by the new network with broadband downloading capacity up to 100Mbit/s, by a mix of technologies: 75% with FTTCab solution and 25% with FTTB, especially in main cities. The remaining 35 % will be served by FTTE solutions. The choice between FTTCab and FTTB in the different cities will be based on the housing market structure, the availability of existing infrastructure in the secondary network (fiber and ducts) from municipalities, utilities, and alternative providers or using the legacy infrastructure of Telecom Italia Socrate project.[9] To understand the economics and regulatory implications of this process, it is interesting to look at the deployment of Telecom Italia NGAN in Milano.

[9] The Socrate project is described in detail below in the paper.

On May 30th 2007, Telecom Italia signed an agreement with Metroweb (MW), to use MW fiber to deploy TI next generation access network in Milano. Milano is one of the richest and quite densely populated areas in Italy. About 6% of the total number of Italian household's lives within the boundary of the telephone district [10] of Milan and 5.4% of the total number of Italian enterprises is located in Milan. Metroweb is the owner of the widest distributed fiber optical network in the strategic areas of Milan and Valtellina. Metroweb operates as an independent open network access provider that offers its infrastructure to third party providers of telecommunication services such as Internet Service Providers, telephone operators including mobile, government agencies and other distributors of digital/multimedia contents.[11] Top quality connections are guaranteed through service level agreements. 76, 5% of Metroweb S.p.A. is owned by the fund Stirling Square Capital Partners Fiber Holding SCA and the remaining 23, 5% by Azienda Elettrica Milanese S.p.A. (AEM).[12]

Through this 15 years agreement (renewable for additional 15 years) TI will be able to reach with FTTB solutions 70.000 buildings in Milan. The overall cost for TI to use MW network is estimated in 50 m Euro. Metroweb's fiber will be used by TI only in the secondary access network, from the optical splitter of TI to the ONU in the building or near by, while it will use its own fiber in the primary access network. TI will be using no more than 8 fibers out of cable made by 24 to 96 fibers. It means that there is enough capacity for other operators to replicate TI agreement with Metroweb. As a matter of fact, Metroweb is already offering fiber to Fastweb, the first operator to offer since 1999, in Italy an all IP fiber network and the major broadband competitor to TI in Milano.[13] Actually, other companies such as COLT, having plenty of fiber in the primary access network could replicate TI solution. TI is choosing FTTB instead of FTTcab architecture in Milano because of the availability of alternative fiber infrastructures to its own copper network. Metroweb is acting as a wholesale open access network provider allowing TI to use the same access fiber network Fastweb is already using to compete with TI in the residential market (see Table 2). Furthermore, as shown in Table 3, in Milano there are 16 alternative telecom operators that offer services to business customers with their own fiber infrastructure. Therefore, it is clear that TI has no dominant position in the wholesale fiber market.

As far as the LLU market is concerned, as shown in Tables 2 and 3, in Milano there are 4 alternative operators in the residential market and 8 alternative operators in the business market using LLU to compete with TI.

[10] *Telephone District* is a geographic area identified by the same area code.
[11] On the sustainability of these open access models see Banerjee, A. and Sirbu, M (2006), Fiber to the Premise (FTTP) Industry Structure: Implications of a Wholesale-Retail Split**,"**
[12] To know more about Metroweb see : http://www.metroweb.it/index.php
[13] Up to June 2003, Fastweb owned directly 23% of Metroweb and after that date sold its shares to AEM . As of April 2007 Fasweb 's network -23.500 km –covered 45% of the Italian population, 10 m home passed and 850 Local switches with LLU. 4 b euros invested since 1999. 1.062.400 customers

Table 2: Alternative operators in the residential market

District	Number of. households per District	% over the total number of Italian households	Number of alternative operators with their own fiber infrastructure	Number of alternative operators using LLU
Bologna	363.418	2%	1	4
Genova	317.924	1%	1	3
Milano	1.193.891	6%	1	4
Napoli	1.119.099	5%	1	3
Roma	1.326.025	6%	1	4
Torino	770.149	4%	1	4
	5.090.506	**24%**		

Source: ISTAT, Analysys 2004

Table 3: Alternative operators in the business market

District	Number of enterprises per District	% over total number of Italian enterprises	Number of alternative operators with their own fiber infrastructure	Number of alternative operators using LLU
Bologna	77.250	1,9%	11	7
Genova	50.042	1,2%	8	5
Milano	223.220	5,4%	16	8
Napoli	163.981	4,0%	12	6
Roma	236.733	5,7%	14	8
Torino	139.132	3,4%	13	8
	890.358	**22%**		

Source: ISTAT, Analysys 2004

If we look at the broadband retail market , as shown in Table 4, we find that TI in Milano has 43,9% of the market and is well below the 50% share frequently used by the Italian National Regulatory Agency (AGCOM) to claim the dominance of TI in the broadband market.[14] Furthermore, this share is declining over time.

The Milano's competitive scenario, where full facilities-based competition already exists, sets the development of Next Generation Access Network in a totally different situation compare to the first round of market reviews and calls for the identification of relevant market on a geographic basis to limit regulatory intervention only to *existing enduring bottlenecks*.[15]

[14] AGCOM (2007), Annual Report, pag. 22.

[15] The Italian National Regulatory Agency (AGCOM) while it has defined so far national markets, has imposed some geographic differentiation of regulatory remedies, in particular imposing WLR regulation only in areas where access seekers are not yet using LLU. This issue is addressed in more detail below in the paper.

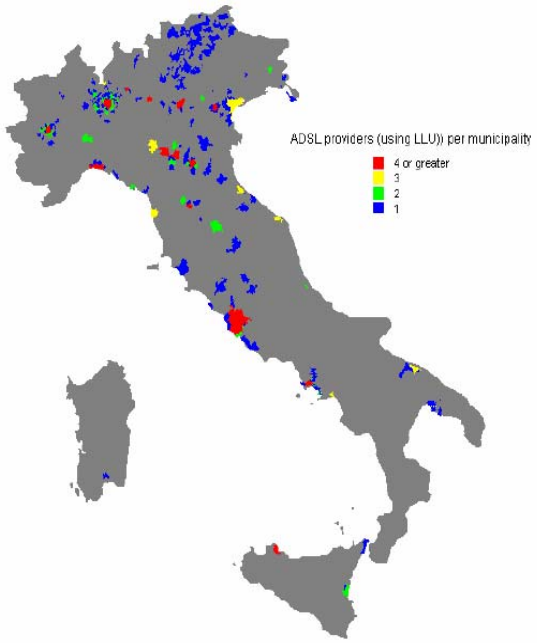
Table 4: TI market share in the Broadband Retail Market

District	31.12.2006	31.03.2007
Bologna	64.4 %	61.9 %
Genova	49.6 %	47.8%
Milano	45.1 %	43.9 %
Napoli	65.6%	63.6 %
Roma	49.7 %	48.3%
Torino	58.6 %	57.0 %
6 Districts Total	53.5 %	51.9%
Nationwide Total	67.0 %	65.3 %

Source: Telecom Italia's Estimates

Is Milano an isolated case in the Italian competitive landscape? Milano has definitely some unique characteristics such as the extensive presence of Metroweb fiber network, but in quite few metropolitan and middle-size Italian cities many operators already compete with TI using LLU or their own fiber infrastructure. Figure 4, shows a map of the frequency (4 or more, 3, 2 and 1) of ADSL providers using LLU clustered per municipalities. It is clear that the presence of alternative operators is growing from the major metropolitan cities to smaller cities showing remarkable variations in the competitive broadband scenario.

Figure 4: Geographic distribution of LLU Alternative Operators



Fonte: Analysys 2005

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Tables 2 and 3 show for the major Italian districts the number of alternative operators with their own infrastructures serving residential and business markets and Table 4 presents estimates of TI market share in this areas. It is clear that, beside Milano, in Genova and Roma TI is well below the 50% market share of the retail broadband market. Actually, Fastweb has already 1.5 m home passed with its own fiber network. Furthermore many utilities and municipalities own infrastructures (ducts and fibers) that can be used to built next generation access networks as TI is doing in Milano using MW facilities. Table 5 offers an overview of the available infrastructures.

Finally, we need to mention the presence of the legacy infrastructure from the Telecom Italia's *Socrates* Project, conceived in the middle 90's with hybrid technology HFC (fiber + coax) to bring pay TV and multimedia services to Italian households. Although this project was stopped after TI privatization in 1999, it left TI's network with an "endowment" of fiber and ducts for 1.6 m home passed in 58 major Italian cities, except Milano, mostly located in Northern Italy.

Actually, these ducts were open to competition by an Antitrust Proceeding in 2001, leading the way to e.Biscom (merged with Fastweb in 2004) to sign an agreement to use TI's free duct capacity.[16]

Table 5: Infrastructures owned by Utilities and Municipalities

	Utilities	Local Municipalities
Piemonte e Valle D'aosta	Torino: IRIDE	Comune Torino; Provincia di Alessandria; Comune di Cuneo/Savigliano; Comune Novara
Lombardia	Milano: Metroweb; Brescia: ASM; Mantova: TEA; Bergamo: ASM, BAS-COM, TEB; Cremona: AEM	
Veneto, Trentino e Friuli	Verona: AGSM, Acque Veronesi; Venezia VENIS e INSULA; Padova APS, TELETRETE NE; Trieste: ACEGAS/APS e MERCURIO	Comune di Venezia; Provincia Trento; Comune Trento; Comune Rovereto
Emilia R., Marche e Umbria	Bologna: HERA-Acantho/Lepida; Modena: HERA-Acantho/Lepida; Reggio Emilia: LEPIDA/ENIA; Parma: LEPIDA/ENIA; Piacenza: LEPIDA/ENIA	Comune Bologna; Comune Piacenza; Comune Reggio Emilia; Comune di Modena; Comune Assisi e Comuni PIR
Toscana e Liguria	Genova: SASTERNET; Firenze: Aziende municipalizzate	Comune Siena; Comune di Genova
Lazio, Abruzzo, Molise e Sardegna	Roma: ITALGAS, ACEA, ATAC, ATI ROMEO; Termoli: Consorzio industriale	Comune di Roma (Municipio III); Comune Cagliari; Comune L' Aquila
Campania e Puglia	Napoli: ARIN, NAPOLETANA GAS, ANM, Società Tangenziale, ACEA, ENEL; Salerno: FINAGEN;	Comune Bari; Comune di Napoli
Calabria e Sicilia	Palermo: AMG e AMAP; Siracusa: Siciliana GAS- Gruppo ENI, ENEL	Comune di Catania; Comune di Messina; Comune di Reggio Calabria; Comune di Siracusa

[16] On Jan. 23, 2001 AGCM, the Competition authority, approved a concentration whereby Seat Pagine Gialle (Telecom Italia) acquired control of Cecchi Gori Communications subject to conditions. One of the conditions was that TI must from March 1, 2001 onwards provide access to duct so that alternative operators can place their fibre optic lines *"for the provision of interactive and multimedia services"* in TI's existing duct infrastructure. The access must be provided at non-discriminatory terms and cost oriented prices. See AGCM (2001).

The *Socrates* network will play an important role in the definition of the mix of FTTcab/FTTB solution for the deployment of next generation access network of Telecom Italia, but it also available for the NGAN investment projects by other telecom operators.

III. Regulatory policies for NGAN

In the previous section, we have stressed that NGAN represent a significant technological evolution that allow a spur of infrastructure-based competition at least in selected metropolitan areas. In this section we first discuss the main regulatory models proposed for the transition to NGAN, and then we focus on what we consider the key issue from a regulatory point of view: the achievement of proper market definitions to take correctly into account the emergence of NGAN.

A. Regulatory models for the transition to NGAN

The transition to NGAN raises a number of very complex regulatory issues. It is in fact the first time that a dramatic change in fixed access technologies is occurring in a large number of industrial countries. Due to the likely implications on investments, innovation and competition, it is no surprise that such a technological transition is now at the core of the regulatory debate.

The main regulatory models proposed so far to address NGAN are the followings.

1. ***Extension of current wholesale regulation:*** it has basically been proposed by ERG (2007). It focuses on the extension of current wholesale regulation in markets 11 (local loop unbundling) and 12 (wholesale bit-stream access) in order to address the new bottlenecks brought about by NGAN.
2. ***Regulatory forbearance:*** it foresees no regulatory measures on NGAN. It is essentially the regulatory model advocated by the USA and Hong Kong.
3. ***Temporary forbearance (regulatory holidays):*** this model, initially proposed for Germany, foresees no regulation of so-called emerging markets for a certain period of time. It is therefore a "wait and see" regulatory model.

We believe that a mere extension of the existing obligations on the incumbent operator onto new technologies – as basically suggested by the first model - it is not the correct regulatory answer to the roll out of NGAN. Such an approach would in fact risk hindering or impeding new investments and innovation. However, we also believe that both the "Regulatory forbearance" and the "Temporary forbearance" models can be satisfactory for a given country/region but, at the same time, completely inappropriate for another country/region. In fact, the above regulatory models have a common relevant flaw: they continue to advocate national patterns of regulation whilst, in our opinion, the novelty of NGAN calls for a radical shift of regulation at the geographic level in order to take into account the large differences in terms of competing networks and infrastructures that can be found within a given country.

Ex-ante interventions should be called for only when NRAs demonstrate the presence, at the local level, of "essential" or "indispensable" facilities which can not be duplicated or substituted by innovative facilities. Only these kinds of facilities represent a durable barrier to entry which gives rise to market failures that competition law may be insufficient to prevent. These facilities could include, if proven necessary at the local level, ducts. In addition, a clear-cut legacy advantage

(main reason to justify the *ex-ante* regulation) given by the metallic local loop will remain only with regard to the so called sub-loop, a network component which is already regulated.

In sum, we advocate a "**geographic based regulation of enduring economic bottlenecks**": the regulatory approach towards NGAN should limit ex-ante access regulation to those enduring economic bottlenecks found at the level of specific geographic markets. This general principle needs to be accommodated first of all by means of appropriate market definitions in order to avoid unnecessary regulation.

B. Market definition in a NGAN framework: The product dimension

It is well known that the European Regulatory Framework (ERF) is based on technological neutrality and aims at regulation of services and products regardless of the technology of the network used to deliver them. This means that any regulatory measure must take into account the service in question and not the network nor the technology with which the service is provided.

In regulating the service markets the ERF indicates three fundamental steps:

- The definition of relevant markets appropriate to national circumstances (market definition);
- An analysis of the relevant market in order to establish whether a given market is effectively competitive and to identify, if any, undertakings with significant market power (SMP operators) on that market (assessment of significant market power);
- The imposition of the appropriate ex-ante remedies to correct/avoid the possible market failures due to dominant positions.

We contend that in order to decide whether to regulate or not a given service provided over a NGAN the first step – market definition – is the most important one. In fact, it is basically at this stage that the regulatory approach towards NGAN services will be largely shaped.

As well known, a proper market definition procedure should consider two dimensions:

- a product dimension; and then
- a geographic dimension in which the product is offered at similar conditions.

We first concentrate on the product dimension.

From the point of view of product dimension, it can reasonably be assumed that the class of services provided over NGAN will include both the traditional communications services and the new ones. It follows that the services that would be provided over NGAN will:

- in part substitute the existing services;
- in part not substitute the existing services.

In order to establish empirically such a differentiation, the substitutability test, the so-called SSNIP (Small but Significant and Non-transitory Increase in the Price) test, is the correct regulatory tool.

Let us now consider the first case, i.e. a given service provided over NGAN which is substitutable to an existing one. There are two alternatives which are correctly addressed by CMT (2007). Broadband services that could be provided over improved or updated infrastructures include, among others:

- existing services; and
- substitute services to the existing ones.[17]

According to CMT only the first grouping should lead to the potential imposition on the new network of the already existing obligations on the legacy network: in fact, offering the same service over a new infrastructure would not justify the imposition of different obligations from those already imposed in the relevant market to which the existing service pertains.

With regard to the second grouping, before deciding to impose new obligations on the new network, NRAs should evaluate the sufficiency of the imposed obligations only on the legacy network elements. This conclusion is fully consistent with ERG (2006). In particular, ERG contends that "*.. the non-imposition of remedies on Voice over Broadband (VoB) services, where SMP has been found on a retail market comprising both PSTN calls and VoB services, may be justified if wholesale access regulation is sufficient to prevent leveraging*".[18]

Let us now consider the second case, i.e. a given service provided over NGAN which is not substitutable to an existing one. This grouping is particularly relevant since services of this nature may be considered an emerging market. Accordingly, a service provided over NGAN considered an emerging market shall not be regulated.

In particular, once established that a given service is not substitutable to the existing ones, and then does not fall within an existing SMP market, regulators may decide to investigate further the new market in order to establish whether it may be an additional candidate to ex-ante regulation. To this end the regulatory tool set out by the European Commission is the so-called Triple-Test. According to this test, a given market is susceptible to ex-ante regulation only if the following conditions are cumulatively met:

- the market is characterized by high and non transitory barriers to entry;
- it emerges an absence of tendency towards effective competition;
- competition law is relatively not sufficient in addressing market failures.

If the above conditions are not met, the service shall not be regulated; on the contrary, if the conditions are met, the service is a candidate for regulation. However, the specific regulatory measures will require a market analysis of the wholesale services that are to be supplied in order to compete in the downstream retail market.

It is therefore required a significant effort in terms of a correct definition of the product market before regulating services provided over NGAN.

[17] We will discuss below the case of new services delivered via new infrastructure.
[18] ERG (2006) pag. 117.

In addition, it may be very useful to establish appropriate empirical criteria ensuring a differentiation of the regulation – if any - regarding the new services and the regulation regarding those services which may substitute the existing ones.

To this aim, the "*anchor product regulation*" proposed by Williamson (2007) can be a good reference. NRAs may set an appropriate bandwidth "threshold" over which new innovative services (ultra-broadband services such as IP TV streaming services) can be provided unregulated. The services above this bandwidth would be considered as pertaining to a new relevant market and therefore the regulatory intervention would not be justified. As regards the services substitute of the existing services, "*anchor products*", that is virtual equivalents of existing broadband and voice services offered over NGAN, would remain available at the same price as existing services.

C. The definition of geographic markets in the European New Regulatory Framework

Having established the product definition of a relevant market, the second step is the identification of its geographic scope. We will discuss at length this second methodological step since it is essentially an area which has basically not been addressed by regulators. We start by reviewing the approach taken by the European New Regulatory Framework as regards the definition of geographic markets.

The large number of market analysis completed so far by NRAs show that European regulators have almost invariably identified national markets. Indeed, NRAs have been very reluctant in identifying specific geographic markets on the grounds of the 18 markets identified in the European Commission (EC) Recommendation on Relevant Markets (2003).

The definition of geographic markets by NRAs is however a duty clearly foreseen by the Framework Directive (2002), whereas article 15, paragraph 3 establishes that "*National regulatory authorities shall …define relevant markets appropriate to national circumstances, in particular relevant geographic markets within their territory, in accordance with the principle of competition law*". Furthermore, Recital 27 of the Framework Directive, establishes that "*National regulatory authorities should analyze whether a given product or service market is effectively competitive in a given geographical area, which could be the whole or a part of the territory of the Member State*." Accordingly, the Framework Directive, which has been transposed in every EU Member State, has given to NRAs clear-cut powers, as well as duties, as regards the definition of geographic markets.

In particular, the methodology to be used by NRAs to define the geographic scope of the markets identified in the EC Recommendation has been addressed by the EC Guidelines on Market Analysis and the Assessment of Significant Market Power (2002).

First, the EC Guidelines point out that the definition of the geographic dimension of a given market is a methodological step which follows the definition of the product market: it is only after a given market has been defined in terms of products/services that the existence of a geographic dimension for such a market can be investigated by regulators.

Second, the EC Guidelines establish the following general definition of a geographic market: "*the relevant geographic market comprises an area in which the undertakings concerned are involved in the supply and demand of the relevant products or services, in which area the conditions of*

competition are similar or sufficiently homogeneous and which can be distinguished from neighbouring areas in which the prevailing conditions of competition are appreciably different".[19]

Interestingly to note, such a definition is basically the same adopted by the EC in its "Notice on the definition of relevant market for the purposes of Community competition law" (1997). It follows that the definition of geographic markets for regulatory purposes adopted by the Commission is fully consistent with competition law principles.

The above definition of a geographic market entails that in order to state that a given product market is characterised by a geographic dimension, it is not required that the conditions of competition in a given geographical area are perfectly homogeneous; it is sufficient a finding of similar or sufficiently homogeneous conditions of competition.

Cave, Stumpf and Valletti (2006) point out, however, that the interpretation of homogeneity of conditions of competition is not straightforward and deserves a careful scrutiny. As regards the demand side, they note that "*the number and concentration of buyers might differ from region to region, although consumers' preferences may be fairly homogeneous (absent substantial income differentials)*".[20] Indeed, in the metropolitan areas a larger concentration of buyers, mostly business buyers, is usually found. In addition, per capita income can also significantly diverge between metropolitan areas and less developed urban and rural areas. Therefore, demand side conditions could significantly diverge between different regions.

As regards the supply side, Cave, Stumpf and Valletti point to the very important role played by networks' availability at the local level. They stress that whereas mobile networks tend to be available nationwide, fixed networks are mostly deployed in heavily populated areas. As a result, supply side conditions in fixed telecommunications markets can significantly diverge at the local level.

It appears therefore that geographic markets should not be considered exceptions in fixed telecommunications; rather, narrowband access markets as well as broadband access markets are likely to show very often the features of geographic markets.

However, as already pointed out, European NRAs have so far refrained from identifying geographic markets. A number of factors provide some explanations for what can be considered, in our view, an incorrect transposition of the European framework.

First, the market analysis procedure foreseen by the New Regulatory Framework is very burdensome. A large number of European regulators have faced a lot of unexpected difficulties in completing the reviews in due time. Accordingly, it is not surprise that NRAs have not devoted time and resources to an additional and rather ambitious goal – the investigation of potential geographic markets.

Second, the definition of geographic markets by NRAs is subject to the veto power of the Commission, as set by article 7, paragraph 4 of the Framework Directive, whilst this procedure does not apply in case the relevant market notified by a NRA does not differ from those listed in the EC

[19] EC (2002) C 165/13).
[20] Cave, Stumpf and Valletti, (2006), pag. 29.

Recommendation. The latter seems therefore an additional relevant factor explaining the laziness and indolence of European regulators as regards geographic market definition.

Last, it is also important to take into account the possibility of a geographic differentiation of remedies without a proper identification of geographic markets. Such a regulatory approach has been endorsed by the EC in the draft of the new Recommendation on Relevant Markets (2006). The Commission states that it can be valid both the identification of geographic markets and the differentiation of the remedies imposed if the nature or degree of market failure differs within the national territory.

Along the same lines, ERG (2006) maintains that geographical variations in remedies may be justified even if markets are national in character due to a common pricing constraint. ERG contends that notwithstanding such a pricing constraint, demand and supply conditions may be very different at the local level. Among others, ERG recognises that long-term prospects for infrastructure competition may significantly differ within a national market. In such circumstances, ERG concludes that a geographic differentiation of remedies can be fully justified. Clearly, a geographic differentiation of remedies without identifying proper geographic markets is an easier approach: in fact, it is not required neither a formal demonstration of the existence of a given geographic market, nor the article 7, paragraph 4 procedure foreseen by the Framework Directive.

D. Regulatory experiences in the definition of geographic markets

In the previous paragraph we have reviewed the European regulatory framework in terms of geographic markets definition. We now review the very limited practice gathered in this area by some NRAs. In fact, geographic markets have been so far only the subject of consultation documents.

OFCOM (2006 b) has given significant importance to the geographic dimension of product markets in the review of the wholesale broadband access. OFCOM has proposed the following geographic sub-markets, characterized by similar levels of competition:

- Hull area: exchanges where Kingston Tlcs is the only operator. This area covers 0.7% of the UK population;
- Market 1: exchanges where BT is the only operator. This area covers 24% of the population;
- Market 2: exchanges where there are 2 or 3 operators and exchanges where there are 4 or more operators but where an exchange serves less than 10.000 homes and businesses. This area covers 21% of the population;
- Market 3: Exchanges where there are 4 or more operators and where an exchange serves more than 10.000 or more homes and businesses. This area covers 54% of the population.

The proposal by OFCOM is very innovative since the selected geographic dimension is the exchange, indeed a very small portion of the territory. This is undoubtedly a somewhat radical approach to geographic market definition. However, we believe it makes sense since it is exactly at the exchange level that the real degree of infrastructure-based competition can be fully evaluated.

OFCOM considers that BT has SMP in Markets 1 and 2, whilst Kingston has SMP in the Hull area. In Market 3 competition is vigorous. In addition, OFCOM expects relevant changes in the degree of competition in this market as LLU operators rollout their services and grow their customer bases.

Accordingly, OFCOM has proposed to evaluate in a second public consultation whether BT holds an SMP position in Market 3. In case BT is not found SMP in Market 3, it follows that OFCOM will not be able to impose any remedies.

OFCOM (2006 a) has also published a discussion document exploring the issues related to the definition of geographic markets for the various leased lines product markets in the UK. The findings of the study show that there are variations in competitive conditions on a geographic basis in the following services:

- Wholesale high bandwidth traditional interface symmetric broadband origination (TISBO - part of market 13);
- Wholesale alternative interface symmetric broadband origination markets (AISBO - part of market 13);
- Wholesale trunk segments (market 14).

In OFCOM's view, it could be appropriate to either define local geographic markets for these wholesale services and then assess market power and apply remedies as necessary, or, alternatively, to vary remedies on a geographic basis, but within a national market.

CMT - the Spanish regulator - has recently published a consultation paper entirely focused on the regulatory implications of the introduction of NGAN (CMT, 2007). In this framework, the definition of geographic markets is seen as an essential tool in order to introduce proportional and justified regulatory obligations. CMT takes the view that the roll out of NGAN will take place in the following geographic markets:

- Market 1: only one operator with its own infrastructure;
- Market 2: two operators offer access, one operator with its own infrastructure and one in LLU;
- Market 3: two operators offer access, both of them with their own infrastructure;
- Market 4: three operators offer access, 2 with their own infrastructure and 1 in LLU.

On the grounds of this proposal, CMT is investigating the possibility of a shift in the definition of markets 11 and 12 (respectively, LLU and wholesale broadband access) from a national dimension to a geographic one.

Finally, the geographic differentiation of remedies has been implemented by AGCOM - the Italian regulator. In the review of markets 1 and 2 (respectively retail telephone access markets for residential and business customers) AGCOM (2006 a) has imposed on Telecom Italia the obligation to provide the WLR (Wholesale Line Rental) service. However, such an obligation has been restricted to the exchanges where the LLU service is not in place. As a result, WLR is a regulated service available only in a number of exchanges. The justification for such a regulatory approach is the attempt not to jeopardise LLU competition in the local areas in which it is now vigorously developing.

The same regulatory approach has been taken by AGCOM (2006 b) in the review of market 12. In fact, AGCOM has imposed on Telecom Italia the obligation to provide the bit-stream service not only at the parent switch, the distant switch and the IP remote node level, but also at the exchange level. However, the latter obligation, as in the case of WLR, has been restricted to the exchanges where the LLU service is not in place.

The decisions taken by AGCOM represent therefore what could be an emerging regulatory practice: on the one hand, the definition of relevant markets is maintained national in scope; on the other hand, remedies are geographically differentiated in order to take into account the different supply side conditions at the local level.

E. Market definition in a NGAN framework: The geographic dimension

We can now address what we consider the core issue in establishing a fair regulatory policy to tackle the competition problems raised by the emergence of NGAN: the definition of appropriate geographic markets in the specific case of services provided over NGAN.

A correct completion of the first step of market definition – the product dimension – is in fact not sufficient: if relevant markets remain national in scope, whilst they should be defined at the local level, it follows that obligations would be imposed at the national level (with the significant exception, however, of a possible geographic differentiation for some wholesale services) and, then, they could be, at best, appropriate for some local areas but, at the same time, completely inappropriate for other local areas, thus creating in these areas artificial regulatory barriers to the development of an effective competition in the provision of services based on the new FTTH, FTTB and FTTCab architectures.

In order to deliver correct market signals to investors and innovators, regulators should therefore concentrate on proper definitions of wholesale markets at the local level. To this aim, **it is key a new geographic definition of markets 11 and 12**, the pillars of the regulatory intervention currently ensuring, respectively, an infrastructure-based competition by means of local loop unbundling, and a "light" model of competition (very often a simple resale model) based on the provision of bit-stream access products.

We contend that local areas like Milano in Italy should be carefully identified by regulators. Such local areas might give rise to a first grouping of geographic markets which, in our opinion, would not deserve any regulatory treatment neither in terms of new obligations in market 11 nor in terms of new obligations in market 12. The presence of inter-platform competition or, alternatively, the presence of fibre open access networks, such as the Metroweb network in Milano, or, still, the availability of legacy infrastructure which are *de facto* already open to third parties access due to the existence of antitrust undertakings (the case of Telecom Italia's *Socrates* Network), would in fact **fully justify the lack of any asymmetrical obligations regarding the new networks** (geographically-based regulatory forbearance).

Commercial agreements between operators (like the Milano example clearly shows) and, in addition, the existing antitrust rules in countries like Italy can indeed be sufficient in these areas to ensure that potential investors develop their NGANs according to their business plans.

It should also be noted that in case commercial agreements were deemed by regulators an option not completely satisfactory, NRAs might nonetheless introduce symmetrical regulation in order to eliminate possible barriers either impeding or delaying the competitive roll out of NGAN.

A second grouping of local areas deserves careful investigation. We refer to areas that on the one hand are marked by a lack of inter-platform competition and/or suitable open access networks, on the other hand show vigorous LLU competition. In this type of local areas, the transition from LLU to

either a FTTCab or a FTTH/FTTB architecture could be for OLOs economically sustainable, provided that civil engineering costs, that represent the most relevant cost factor in the roll out of NGAN, are substantially reduced by means of access to existing ducts, suitable for fibre deployment, which can be owned by a number of different operators or municipalities.

In the second grouping of local areas it makes sense the adoption of a regulatory strategy that incentive OLO's investments in NGAN. To this end, whereas new obligations in market 11 may be appropriate and justified if aimed at regulating access to the enduring economic bottlenecks found at the local level, we deem that new obligations in market 12 would be detrimental for the development of OLO's investments since they would clearly incentive a lighter scheme of competition whilst a stronger scheme could indeed emerge.

Finally, we deem that in the remaining local areas in which NGAN will be deployed by incumbents – a third type of grouping – wholesale regulation could broaden its scope by imposing remedies also in market 12 so to allow OLO the possibility to compete by means of appropriate bit-stream services. This regulatory approach would not certainly negatively affect investments (that in fact would be in any case very unlikely) whilst would allow the only type of sustainable competition.

F. Standard remedies vs. functional separation

The regulatory approach towards NGAN outlined in this paper has a relevant implication: **the existing so-called standard remedies, appropriately differentiated at the local level, may be sufficient to address the new bottlenecks – if any - driven by the roll out of NGAN.**

Accordingly, we do not consider a timely discussion the proposal to introduce functional separation as an exceptional remedy, in order to ensure a competitive deployment throughout Europe of NGAN, currently at the core of the European debate. To this end, we also wish to stress the following points.

First, **the introduction of any exceptional remedy should require a very comprehensive market analysis.** It should be demonstrated both the failure of the existing standard remedies with regard to the competition problems raised by NGAN, and the advantages in terms of social welfare determined by the introduction of an exceptional remedy, such as functional separation, taking into account the costs incurred.[21] However, it can be easily argued that it cannot be claimed at this stage any regulatory failure of the existing standard remedies in the case of NGAN simply because they have still to be imposed. Actually, this conclusion is fully consistent with the regulatory policy advocated by ERG (2007). In fact, ERG has called for an extension of current wholesale regulation in markets 11 and 12 - a position which we have criticized - but, in no way, it has introduced the option of functional separation in the public consultation document.

Second, **the identification of geographic markets is clearly not consistent with the introduction of functional separation on a nation-wide basis**. In fact, the identification of different geographic markets entails the recognition that the conditions of competition significantly diverge between different localities. In turn, as argued above, not only standard remedies should be geographically differentiated but also exceptional ones (if adequately justified). It follows that **the**

[21] The issue is discussed at length by Amendola, Castelli and Serdengecti (2007).

introduction of a functional separation of the access network should be justified at the level of each geographic market.

However, we have argued that in areas like Milano - the first grouping in our taxonomy – it would be fully justified the lack of any asymmetrical obligations regarding the new networks. If such a conclusion is accepted, it follows that the introduction of an exceptional remedy such as functional separation would be, at least in these areas, a measure without any regulatory rationale.

The introduction of functional separation is also likely to be detrimental in the second grouping of local areas, i.e. those areas marked by vigorous LLU competition. Functional separation of the access network, combined with the equivalence of input requirement, could indeed discourage OLO from taking the risks associated with deploying their own access network facilities. On the contrary, appropriate standard remedies in market 11, as already contended, may stimulate the transition from LLU to either a FTTCab or a FTTH/FTTB architecture.

IV. Conclusions

Regulatory governance of Next Generation Access Networks in Europe cannot follow the "One size regulation fits all" approach. In fact, although we do not think that fibre in Europe will follow the US example - the forbearance model - we strongly believe that regulation will need to be made more flexible. If promoting facilities-based competition is the goal, then it may be more appropriate to **geographically differentiate the access regulatory regime** based on the different underlying cost conditions of entry and presence of alternative platforms.

Our review of some European studies on NGAN in Europe and our specific focus on the Italian situation, in particular on the competitive situation in Milano, has shown the relevant flaw of continuing to advocate national patterns of regulation while, the deployment of NGAN calls for a radical shift of regulation at the geographic level. Actually, the timing and the choices of specific technologies for NGAN may vary between countries, between geographic areas as well as between operators. These differences depend on a plurality of factors and regulation should take all of them into account.

Furthermore, we suggest that, the recognition that a NGAN business case does exist for OLO in a number of local areas, mainly metropolitan ones, has relevant regulatory implications.

First, since the conditions of competition significantly differ among local areas, we claim that regulation should promote both incumbents and OLO's investments in NGAN by limiting ex-ante interventions to those enduring economic bottlenecks found at the level of specific geographic markets.

Second, market definition is the most important step in the market analysis procedure in order to decide whether to regulate or not a given service provided over a NGAN. We have proposed a taxonomy of local areas that may be adopted in country like Italy for the purpose of a correct geographic definition of markets 11 and 12 and, as a consequence, for the imposition of appropriate remedies. Among others, it emerges that the adoption of a regulatory forbearance model in local areas like Milano is fully justified.

Third, the introduction of functional separation is at this stage not justified since standard remedies may be sufficient to address the new bottlenecks driven by the roll out of NGAN. In addition, we point out that the identification of geographic markets by NRAs would not be consistent with the introduction of functional separation on a nation-wide basis.

The analysis presented here demonstrates the importance of shifting regulation at the geographic level. This provides a further justification for prospective analyses aimed at reducing the costs driven by inappropriate regulation.

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