

Report on the Public Consultation

on

The regulatory approach to next generation access networks (NGA)

Index

1	Background	6
2	Analysis and position	9
2.1	GENERAL APPRAISAL OF THE CONSULTATION DOCUMENT	9
2.2	ANSWERS TO SPECIFIC QUESTIONS	16
2.2.1	Introduction	16
Question 1:	What do you anticipate as being the possible needs for greater bandwidth on the part of consumers, particularly in terms of (new) services offered and "downstream" and "upstream" speeds?	16
Question 2:	To what extent can the expected developments in data compression algorithms alleviate the need for increased bandwidth, without compromising the expected and necessary increase in data transmission capacity?	18
Question 3:	Do you identify, at the level of NGA, any aspects related to issues of security and emergency that warrant particular attention?	19
2.2.2	The access market.....	26
Question 4:	How do you view, in general terms, the competitive situation regarding the access network in Portugal?	26
Question 5:	How do you view the development of other access networks, including the coaxial cable network? Is it foreseeable that this network will (also) evolve into NGA supported by fibre?	30
2.2.3	The traditional access network	37
Question 6:	Do you consider that there is currently sufficient level of coverage, not only in geographical terms but also in terms of diversity, of retail offerings supported by LLU? Are there, in your view, any constraints on its expansion?	37
Question 7:	How do you view the current wholesale reference offers, in terms of promoting effective competition and the development of networks and their coverage?	41
2.2.4	Access network developments	49
Question 8:	What is your view of how demand for retail services (new services or similar services with higher bandwidth) will evolve? Please identify any relevant factors, in terms of increased bandwidth, which limit the ability to provide these services to end-consumers?	49
Question 9:	What kind of technical solutions (e.g. point-to-point or point-to-multipoint) and what type of developments in terms of extending the network to fibre optic (FTTx) do you envisage as having most viability in function of the evolution of retail offers, the density and location of the area served, and the topology of the existing network?	50
Question 10:	As a network operator and provider of advanced services, do you foresee that you will advance with the implementation of these solutions based on NGA? If so, which solution(s), on what time scale and with what geographic extension?	54
Question 11:	What technical limitations do you identify with respect to the coverage and choice of configuration and architecture for the various scenarios and solutions?	56
2.2.5	Evolution in Portugal.....	60

Question 12:	Do you consider that there is sufficient information available on the access network (including APs and hybrid or fibre optic loops) and its evolution (including in terms of network structure, technology and number of access points) over the short-term? What kind of impact do you envisage that this evolution will have on your current offers?	60
Question 13:	Do you agree with the proposed rule, and in particular with the definition of different deadlines, for giving prior notice of structural changes to the access network of the incumbent operator? Do you consider that other measures are necessary? If so, what measures?	65
2.2.6	FTTCab and FTTH/B solutions and the impact on LLU	72
Question 14:	From an economic standpoint, and in function of the expected costs (e.g. fibre optic connection and adaptation or installation of street cabinets), do you consider FTTCab to be a viable solution only for streets cabinets with greater capacity and/or located in urban centres or, possibly, at a more global level?	72
Question 15:	From a technical and economic point of view, do you favour a solution in which the streets cabinets are individual (per operator) or do you favour a shared solution? On what terms?.....	74
Question 16:	From an economic point of view, and in function of the expected costs (e.g. fibre optic connection to homes and possible adaptation of buildings to receive fibre optics), do you consider that it is viable to develop optical fibre outside areas of high population density and new construction?	76
Question 17:	What technical and procedural or legal challenges do you consider may impede or limit the development of FTTCab or FTTH/B solutions? Please identify measures which might minimise these problems.....	78
Question 18:	What type of regulatory intervention do you deem necessary and appropriate to ensure that such solutions are possible and are consistent with the objectives of regulation defined in national and community legislation?.....	84
Question 19:	Under what circumstances do you consider that there are grounds for the imposition of obligations with respect to the unbundling of fibre optic in its various forms (e.g. the entire fibre, the wavelength, etc.).....	88
2.2.7	The transition to NGA - (two) networks in parallel and network access	99
Question 20:	Do you consider that it is necessary, from a technical and functional point of view, that, in a given geographical area, the current PSTN/ADSL network (from the exchange) and FTTx solutions (VDSL or fibre optic) should operate in parallel? If you consider that it is necessary, for how long and under what conditions?	99
Question 21:	Do you consider that the conditions exist in Portugal for the development of competing NGA? With that level of geographic coverage?	100
Question 22:	Do you consider, given the stage of development of markets and the characteristics of the access network, that it is it appropriate for there to be a single network supporting the offers of all operators? What impact might this have on the incentive to invest?	103
Question 23:	What considerations are raised by any potential imposition of functional separation with respect to the incumbent's network?	106
2.2.8	The positions of regulators and imposed obligations potentially related to NGA	113
Question 24:	What considerations are raised by the positions - even though preliminary - adopted by the identified NRAs, which seem to give priority, in terms of NGA and compared to the alternative of imposing immediate access to fibre optics loops, to the need to ensure:.....	113

(a)	greater transparency in information about the evolution of the incumbent operator's network;	113
(b)	access already granted for a reasonable period of time;	113
(c)	maintenance of access to the local loop only in the case of copper pair loops (possibly at street cabinet level); and	113
(d)	access to conduits and " <i>backhaul</i> " for connection between street cabinets and the infrastructure of alternative operators?	113
Question 25:	Do you consider that the current RCAO is sufficient for the development of NGA by alternative operators? Where is there room for improvement?	116
2.2.9	Common position of the ERG	129
Question 26:	How do you view the inclusion of fibre optic loops in the (new) relevant market 4? Do you identify the same type of constraints in the development of fibre optic loops as seen with respect to the copper network? What are the resulting regulatory implications, in terms of obligations (currently imposed with respect to copper loops), including unbundling (full and shared)?	129
Question 27:	With respect to NGA, do you consider it appropriate to consider the definition of geographically segmented markets within the country or some type of geographical differentiation of regulatory obligations? In which markets? In what way?	130
Question 28:	What do you view as the implications of the regulatory measures proposed by the ERG in each one of the FTTCab and FTTH scenarios? What concrete measures do you propose for their implementation?	134
Question 29:	What alternative measures should be considered?	136
2.2.10	The role of the State and the regulator.....	143
Question 30:	Do you consider that current initiatives to encourage investment in networks are sufficient? What other regulatory initiatives or initiative of the State do you consider may create further incentive to the development of NGA, promoting greater territorial coverage and info-inclusion?	143
Question 31:	Do you consider that the networks promoted using public funds should operate as open networks, exclusively enabling the provision of electronic communications services by third parties or, conversely, should be used without restrictions as a form of promoting further competition?	146
Question 32:	In this regard, how can proper incentive for investment and innovation be ensured, while promoting competition, without distortion, and without calling into question the sustainability of the operators who have invested in the development of their networks and in LLU?	147
Question 33:	Do you see that there are constraints in access to basic support infrastructure, including from entities other than operators of communications networks? What constraints? Can you recommend measures to overcome them?	149
Question 34:	Do you view it as opportune to consider amendment of the system of municipal fees for rights of way, and if so in what way?	152
Question 35:	Do you identify particular problems in rolling out NGA in the Autonomous Regions of Azores and Madeira? If so, what problems do you identify and how can they be best overcome?	154
2.2.11	The RCAO and the importance of access to pipelines.....	163
Question 36:	What types of solutions for the development of optical fibre are most appropriate? Do you consider that the current RCAO allows operators to extend their own optic	

	<p> fibre in a massive way to FTTCab solutions, and possibly to FTTH/B solutions? What changes or improvements do you consider are needed in terms of the RCAO, in order to achieve this goal? </p>	163
Question 37:	<p> In view of there being an offer of access to conduits, do you consider that it necessary and justified for the incumbent to establish a dark fibre offer? If so, in what situations? </p>	166
Question 38:	<p> In the event that another operator is the first to occupy the remaining capacity of conduits in a given geographical area, with installation of a fibre network, does it make sense to compel it to grant access to fibre in this geographical area? If so, under what conditions? </p>	168
Question 39:	<p> In a scenario where due to lack of conduit capacity in a given geographical area, where a requirement for access to fibre is imposed (in some of the technically feasible alternatives), do you consider that it would make sense to impose point-to-point topology due to the ease and diversity of access models? </p>	170
2.2.12	ITED regime	174
Question 40:	<p> Do you consider the legal and regulatory rules on access (e.g. in fibre optic) to the buildings and homes of customers by operators to be sufficient, including in terms of incentives for the sharing of support infrastructure? If not, what alternative solutions could be proposed, taking into account the constraints imposed by the legal horizontal property regime? </p>	174
Question 41:	<p> What technical adaptations do you consider should be proposed in terms of ITED, also taking older buildings into account? </p>	176
2.2.13	Reference Unbundling Offer (RUO)	180
Question 42:	<p> Do you consider that the problems identified and remedied in respect of the RUO have analogy with those relating to access in a fibre optic network? </p>	180
Question 43:	<p> Do you consider that specific measures are needed to protect investments based on the RUO? If so why and what? </p>	182
2.2.14	The reference offer for the supply of wholesale broadband access (RAPT)	188
Question 44:	<p> What changes do you consider are necessary in the wholesale broadband offer, in order to guarantee high coverage and capacity for differentiation? Do you consider it appropriate to have local access at the level of DSLAM and/or Ethernet interface? </p>	188
Question 45:	<p> Do you consider that the retail offers supported over the (future) RAPT should be able to compete, in terms of features and coverage, with offers supported over unbundled loops? For example, should the RAPT support the offer of IP-TV services by operators? </p>	190
Question 46:	<p> In the context of an FTTCab scenario, which specific components should be considered in any possible VDSL "bitstream" offer? </p>	192
3	Conclusions	197

1 Background

The objectives of ICP-ANACOM, as established in article 5 of Law no 5/2004 of 10 February (Law of Electronic Communications - LEC), are to contribute to the development of the internal market of the European Union, to promote competition in the provision of electronic communications networks and services, facilities and related services and to uphold the interests of citizens. In pursuit of this last objective, ICP-ANACOM is bound, in particular, to ensure an absence of discrimination in the treatment of companies, eliminate distortions or barriers to competition in the electronic communications sector, and to promote innovation and encourage efficient investment in infrastructure.

Accordingly, it is the intention of ICP-ANACOM to engage in a regulatory approach to next generation access networks (NGA)¹ which is coherent and consistent with the objectives of regulation established in law, in particular, promoting competition and encouraging the development of innovative, diversified and quality services, thereby ensuring the defence of users' interests.

Pursuant to article 6, paragraph 1, point m) of the statutes approved in the annex to Decree-Law no 309/2001 of 7 December, part of the remit of ICP-ANACOM is to conduct processes of consultation and expressions of interest, particularly with respect to the introduction of new services or technologies.

Additionally, it is set out in paragraph 1 of article 8 of LEC that whenever, in the exercise of its remit under this law, ICP-ANACOM intends to take measures with significant impact on the market, it shall provide disclosure of the respective draft, giving stakeholders a period of not less than twenty days during which they may comment.

In this context, by determination of 18 June 2008, approval was given to the public consultation document on the regulatory approach to the NGA. In the same determination a period of 30 working days was established, ending on 1 August 2008, whereby all stakeholders could submit their responses.

During the consultation period, responses were received from the following entities²:

- Alcatel-Lucent Portugal, S.A. (ALCATEL-LUCENT);
- APRITEL - Associação dos Operadores de Telecomunicações (Association of the telecommunication operators);
- Centro de Estudos de Gestão e Economia Aplicada da Universidade Católica Portuguesa (Centre of management and applied economic studies of Universidade Católica Portuguesa);
- COLT Telecom - Serviços de Telecomunicações, Unipessoal, Lda. (COLT);

¹ See definitions and acronyms in the Glossary, in Annex.

² Responses available on the website of ICP-ANACOM: www.anacom.pt.

- CPEC - Comissão de Planeamento de Emergência das Comunicações (Emergency Communications Planning Commission) of MOPTC;
- Ericsson Telecomunicações, Lda. (ERICSSON);
- FCCN - Fundação para a Computação Científica Nacional (National Scientific Computing Foundation);
- Regional Government of Azores (RGA);
- ONITELECOM - Infocomunicações, S.A. (ONI);
- Portugal Telecom SGPS, S.A., PT Comunicações S.A., TMN - Telecomunicações Móveis Nacionais, S.A. and PT Prime S.A. (PT); Portugal Telecom SGPS, S.A., PT Comunicações S.A., TMN - Telecomunicações Móveis Nacionais, S.A. and PT Prime S.A. (PT);
- Rádio e Televisão de Portugal, S.A. (RTP);
- SGC Telecom - SGPS, S.A. (SGC), on behalf of AR Telecom - Acessos e Redes de Telecomunicações, S.A. and WTS - Redes, Serviços de Telecomunicações, S.A.; SGC Telecom - SGPS, S.A. (SGC), on behalf of AR Telecom - Acessos e Redes de Telecomunicações, S.A. and WTS - Redes, Serviços de Telecomunicações, S.A.;
- Sonaecom - Serviços de Comunicações, S.A. (SONAECOM);
- VODAFONE Portugal - Comunicações Pessoais, S.A. (VODAFONE);
- ZON Multimédia - Serviços de Telecomunicações e Multimédia, SGPS, S.A. (ZON).

A response was also received from the Financial Controller of the Ministry of Public Works, Transport and Communications.

ICP-ANACOM is grateful to all these entities for the responses which they submitted and which will enhance the decision-making process.

Some of the responses only address specific issues (e.g., the responses of the equipment manufacturers are primarily focused on issues of a technical nature and the CPEC on the issue of security) and others are limited to addressing the general framework of NGA.

To better organise this report and to facilitate its reading, the entities which responded to the public consultation are grouped as follows:

- Operator with significant market power (SMP) in the broadband access markets (PT).
- Other operators and service providers and their associations (APRITEL, COLT, ONI, SGC, SONAECOM, VODAFONE and ZON).
- Equipment Manufacturers (ALCATEL-LUCENT and ERICSSON).
- Other entities (CEGEA, FCCN and CPEC).

Because they responded to the consultation in general terms, the comments of APRITEL and SGC are mostly limited to the section on general appraisal.

Taking into account NGA's state of development, ICP-ANACOM has chosen to put a set of questions to the market, so that it might take the responses into consideration in the formulation of a position on this matter. Therefore, throughout the present report (which does not provide dispensation from the full consultation of responses), ICP-ANACOM presents a summary of the responses which it received and sets out its position with regard to the issues raised, presenting at the end, a summary of its position of principle with respect to the regulatory approach to NGA.

This position is enhanced in view of the developments arising from the strategic guidelines of the Government for the development and promotion of investment in next generation networks. These guidelines were established in Council of Ministers Resolution no 120/2008 of 30 July (hereinafter "The Resolution")³, as well as the draft Recommendation published on 18 September 2008 by the European Commission on the regulatory approach to NGA (hereinafter referred to as "the draft Recommendation")⁴, which, while not yet a formal and final position of the European Commission, is an important and additional factor that needs to be taken into consideration⁵.

It is noted that approval has also been given to the analyses of the markets of supply of wholesale network infrastructure access (physical) at a fixed location (market 4) and supply of wholesale broadband access (market 5)⁶, which markets include fibre optic access and allow the imposition, under certain conditions, of obligations related to NGA.

The position of ICP-ANACOM which is now being transmitted to the market following approval of this analysis and associated aspects should be viewed primarily as a starting point and a guideline for the regulatory approach, since the determination which will be taken by ICP-ANACOM in this area (and others) are subject to the consultation procedures set out in Law no 5/2004 of 10 February and in some cases, to the requirement of prior notification of the European Commission.

³ Available at: <http://dre.pt/pdf1sdip/2008/07/14600/0511005113.PDF>.

⁴ see http://ec.europa.eu/information_society/policy/ecommlibrary/public_consult/nga/index_en.htm.

⁵ The draft recommendation, despite being a consultation document, is referred to several times in this document because it reflects an initial position of the European Commission on this issue.

⁶ see <http://www.anacom.pt/render.jsp?contentId=599027>.

2 Analysis and position

2.1 General appraisal of the consultation document

PT welcomed the publication of the consultation, which it considers as being of great importance to the future of the sector in Portugal and as a first step towards the definition, in as short a time as possible, of the regulatory approach to NGA. However, it expressed concern about the alleged "*delay in the process of defining the regulatory framework applicable to NGA*", which delay it considers will restrict the definition of its strategy for the development of new access solutions.

PT also expressed concern about what it considered as the "sensation" that ICP-ANACOM was manoeuvring itself into a position of regulatory continuity with respect to wholesale obligations, as a way of protecting investments made by operators in copper access solutions. In this regard, PT takes the view that if the discontinuity of the reference offers or a renovation of the historic network and copper pair solutions was at stake, such an alleged attitude of ICP-ANACOM would be understandable, affirming however that this is not the case. Furthermore, PT states that, although investment in NGA could affect competitors with services based on the local loop unbundling offer (LLU), compromising their ability to compete using copper-based technology, this was the natural consequence of any process of evolution implying technological obsolescence.⁷

PT believes that it has a decisive role in the development of NGA, whereby it should not be subject to discrimination and restriction in respect of its development strategy. The company takes the view that, instead, regulatory action should ensure that all have the same opportunities to invest in the development of NGA. In general terms, PT is of the view that:

- there are no grounds for the regulation of the Services⁸ provided over NGA, since the paradigm of investment in these networks is radically different, requiring heavy investment by all operators, in a scenario characterised by high levels of uncertainty and risk;
- from the outset all operators would be in the same positions with regard to investment in NGA and even alternative operators have embarked on such investments;

⁷ And, citing OFCOM (the United Kingdom NRA), it states that any regulatory measures taken to protect investments made based on the RUO may constitute obstacles to investment.

⁸ According to PT, a model based on competition in infrastructure has many advantages over a model based on competition in services, whereby it argues that regulation should focus on eliminating barriers that prevent or hinder the achievement of efficient investment by all operators.

- the installation of NGA does suffer from the barriers associated with the historic network⁹, whereas other types of barriers are emerging, such as access to buildings and the public domain, as well as access to content;
- NGA would require a new framework with respect to infrastructure in buildings and a new relationship with local authorities with respect to access to the public domain and the maintenance and development of access networks.

PT argues that the spin-off of PT Multimédia (now ZON) from PT¹⁰ - hereinafter "the spin-off of ZON" - will have introduced a level of competition in the access network so far without parallel, with the cable distribution network¹¹ operator having a network with widespread geographic coverage and high capillarity, which fact justifies the adoption of a non-intrusive regulatory approach in Portugal.

PT also highlights the importance of an approach to NGA regulation that is geographically segmented, stating that, in view of the expectation that the installation of optical fibre will occur primarily in urban centres where its market share is substantially reduced compared to other operators, the development of these networks will further drive the geographic segmentation of the relevant markets.

In conclusion, PT would embark on a new technology and infrastructure cycle, which requires non-intrusive regulatory intervention, allowing an appropriate level of financial return that encourages investment and allows foreseeable operational risk to be offset, taking into account that any operator may invest in NGA.

APRITEL also highlights the importance of investment in NGA for the development of the sector and the country, and advocates the need to ensure coherency in the regulatory approach, supported by the investment ladder model. According to the Association, transparency (embodied in the definition of strict rules which minimize asymmetry of information between the incumbent and alternative operators) and equivalent access to infrastructure would constitute minimum conditions for ensuring NGA investment in a competitive and competing environment.

In order to ensure the above principles, APRITEL argues that there should be structural separation of the incumbent operator or otherwise a company (or equivalent mechanism) should be established with the objective of installing and managing infrastructure for the development of NGA (from a wholesale perspective)¹². This model is also explicitly endorsed by all the alternative operators who responded to public consultation (ONI, COLT,

⁹ PT notes that the Reference Conduit Access Offer (RCAO) allows alternative operators to install fibre in the access network, substantially reducing or even eliminating PT's competitive advantage and any horizontal barriers.

¹⁰ On 7 November 2007, PT informed ICP-ANACOM that it had concluded the process of carrying out the spin-off of PT Multimédia.

¹¹ Hereinafter, this operator is referred to simply as cable operator and the network which it operates as cable network.

¹² Which includes, as a minimum, the infrastructure associated with conduits and the local loop.

SGC, SONAECOM, VODAFONE and ZON). According to APRITEL, this model would make the heavy investment needed to develop these new networks viable, maximizing the large economies of scale and range associated with such development, while ensuring the widest possible choice for the end-customer.

With this premise, APRITEL submits detailed comments which are detailed in the responses of individual operators in the section on specific comments. These comments relate to:

- the impact of NGA on the RUO, whereby APRITEL supports the intervention of the regulator in different areas, particularly with respect to the process of establishing Attendance Points (AP) and the relocation of loops, record information, difficulties in access to exchanges, the process of unbundling and levels of quality of service.
- the impact of NGA on the RCAO, recognising that civil engineering work constitutes the main cost component of investment in NGA and that the existence of this offer confers a privileged position on Portugal in this field. However, APRITEL is of the view that this advantage would remain theoretical unless changes are made to the RCAO insofar as (i) there is complete information on conduit records (especially on their occupation), (ii) automated processes are defined for requests for information, scheduling and intervention (eliminating the need to give notice), (iii) the beneficiaries follow the same procedures followed by PTC with regard to the involvement of Municipal Councils in cases of unblocking conduits (prior authorisation), (iv) service level agreements are established (SLA) along with levels of compensation and deterrence, even in cases involving third parties, and (v) poles are included in the RCAO;
- markets 4 and 5, supporting the definition of national markets;
- local government and NGA, drawing attention to the important role played by local authorities in the development of NGA and supporting pro-active involvement in the role of support to the legislature in matters related to the revision of the system of Municipal Fees of Rights of Way (MFRW) and the harmonization of multiple bylaws relating to access to the soil and subsoil;
- the regime governing the planning and installation of telecommunications infrastructure in buildings (ITED), considering it ineffective and insufficient in an NGA context and proposing its revision in certain aspects¹³.

¹³ In particular, the following:

- modification of technical spaces for installation of *client premises equipment* (CPE) to ensure active and passive ventilation and appropriate size;
- adaptation of the internal wiring of houses to provide for the delivery of multiple services using fiber optics in its various divisions;
- inclusion of excess conduit capacity for future use, without which access to future services, such as home automation, may be rendered unviable; and

APRITEL also advocates the inclusion of fibre in the types of loops that may be unbundled, citing the principle of technological neutrality.

The issues raised by APRITEL are endorsed in the responses of several alternative operators. As such, the generic comments which may complement the position expressed by APRITEL are given below.

ONI commented that the option of establishing a company (or equivalent mechanism) with the objective of installing and managing infrastructure for the development of NGA, could include interested operators¹⁴, the government (investing directly under the National Strategic Reference Framework - NSRF¹⁵), local authorities (with the definition of specific licensing models for this purpose), condominium associations and other relevant entities.

In the event that the model described above is adopted, ONI also supports the imposition of symmetric regulation on all operators which develop NGA. Otherwise,¹⁶ the company argues that asymmetric regulation should be maintained with respect to the operator holding SMP in the fixed broadband retail markets. In relation to the infrastructure of other entities which are not operators of electronic communications networks, ONI believes that it is in the general interest that such entities be bound to provide access for the installation of NGA.

SGC affirms that, from its experience, it has faced some of the difficulties raised in the consultation document and it therefore welcomes the visibility which is given to some of its concerns as a result of this framework, including concerns it has about the RAO, "Rede ADSL PT"- hereinafter RAPT -, ITED and relationship with municipal councils.

SONAECOM commented that the first operator to develop fibre optics in any area, derives a significant advantage with respect to gaining customers, and does not see that there are grounds for not recognising PT's status as the natural "first mover".

Contrary to the views of ONI, SONAECOM is of the view that access and use of conduits belonging to entities other than operators of communications networks, while important, does not adequately address the problem of the putting in place conditions of equality with respect to the use of telecommunication conduits, the only conduits which, in its view, are truly of interest in terms of local access. Consequently it argues for that focus should remain on regulating access to the conduits of PTC (advocating the improvement of this offer in line with the comments put forward by APRITEL).

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- building accessibility is sometimes subject to approval of condominiums or to the existence of condominiums with a contract already in place, which puts at risk the very business model that, in general, depends on the sale of services prior to construction of the network.

¹⁴ Which participate in the formation of the consortium or company through direct investment or provision of network resources.

¹⁵ In accordance with the commitment made in Resolution of Council of Ministers no 120/2008.

¹⁶ Implementation of NGA in competition among operators.

SONAECOM also advocates the need to carry out an in depth review of the current scheme governing access to the vertical infrastructure of buildings and also the systems governing municipal fees in respect of soil and subsoil intervention and occupation.

According to SONAECOM, it is necessary to safeguard the investments made by alternative operators with respect to the current broadband access wholesale offers - especially the RUO - by ensuring that it is possible for alternative operators to continue to gain critical mass, enabling them to compete more effectively in the provision of innovative services. Therefore, SONAECOM advocates maintaining existing access obligations that affect PTC and implementing conditions which allow these operators to maintain and develop the assumptions underlying their existing business investment plans and, in future, migrate their customers to offers supported using a component of fibre optic access.

SONAECOM believes that the focus of regulatory action should be on establishing conditions which give impetus to the market by promoting investment and competition in parallel, since only these two elements can ensure innovation, diversity of choice and affordability, while recognizing that the balance is delicate. The company also considers that there should be special focus on ensuring transparency (symmetrical access to information) and non-discrimination, the latter in terms of equivalent access for all those involved (with functional separation, or an equivalent mechanism, having a key role, in the opinion of the operator).

Vodafone, in addition to the positions advocated by APRITEL and by other alternative operators, argues that the strategic priority defined by the Government through the Resolution should be taken up jointly by the operators, regulators, owners of infrastructure supporting electronic communications networks, local authorities, owners of buildings and, particularly, the general public.

ZON is also of the position that it will not be possible to develop NGA unless two structural sector measures are taken: the structural separation of the wholesale business of PTC and, in the short term, the implementation of measures to increase transparency and reduce discrimination for operators benefiting from the RCAO. ZON also takes the view that access to the submarine cable connecting the mainland and the autonomous regions and access to buildings is critical, supporting the revision of the ITED scheme, amendment of the horizontal property regime and the sharing of telecom risers.

The equipment manufacturers - ALCATEL-LUCENT and ERICSSON - consider the public consultation a very important step in the deployment of NGA, which constitutes a strategic priority for Portugal and which will have a particularly positive impact on the economy. According to ALCATEL-LUCENT, the regulatory structure is one of the necessary conditions for the considerable investments in infrastructure by the private and public sector, with key issues being: (i) the reduction of entry barriers, (ii) the promotion of investment, and (iii) the promotion of competition in view of the diversity of the Country.

According to CEGEA, it is possible to deepen the level of the contestability of the electronic communications market in Portugal. It supports the relaxation of the regulatory framework and the definition of contractual structures and incentive systems which encourage investment, innovation and development and, ultimately, social well-being.

The Financial Controller of the Ministry of Public Works, Transport and Communications commented that, from a budgetary point of view, it is necessary to (i) avoid the establishment of new long-term budgetary commitments, in terms of either investment or operational subsidies, and (ii) ensure that the taxpayer is not required to support services that are or should be, self-supporting in nature. Since the taxpayer's resources are scarce and limited, the Financial Controller takes the position that the general revenues of the State should be reserved to support public services that by their nature cannot be self-supporting.

In its response, RTP commented only that RTP/RDP does not provide these types of services, and that it therefore does not have any contribution to make according to the strict scope of the consultation. However, it considers that the development of NGA will enable the introduction of new media services using IP-TV which could lead to an enriched bouquet of available programme services, including high definition, interactive services, and linear and nonlinear versions (among others), whereby it is preferable to ensure must carry conditions from the outset, particularly for the public radio and television service.

Position of ICP-ANACOM

ICP-ANACOM welcomes the interest generated by the public consultation and the fact that most respondents considered the consultation both necessary and timely for the construction of a predictable and appropriate regulatory framework for NGA.

In this process, ICP-ANACOM is aligned, in terms of time-frame, with the European Commission, which on 18 September 2008 published the draft Recommendation on the regulatory approach to NGA, whereas it is noted that the majority of other European regulators have not yet formulated a consolidated position on the issue, which fact has not prevented operators in some countries from drawing up concrete plans for the development of NGA in the short and medium term¹⁷.

In general, the responses of the various alternative operators address (i) the need to ensure non-discrimination, with the argument that this can only be achieved through the vertical separation (structural or functional) of PT; (ii) the establishment of an entity to invest in the development of NGA and to provide wholesale access so that all interested parties can provide services at retail level; (iii) the improvement of wholesale offers, primarily the RAO and RUO (including transparency in the publication of information on the evolution of PT network); and (iv) the revision of the legal and regulatory ITED frameworks and, in particular, relations with local authorities.

¹⁷ See in this respect Annexes 1 and 2 of the consultation document.

In this context, ICP-ANACOM undertakes to conduct an analysis of the issues raised with respect to the RCAO and the RUO, with the expected publication of a draft determination following the recently approved final decision on the analysis of markets 4 and 5¹⁸.

In relation to PT's view that "*from the outset all operators would be in the same positions with regard to investment in NGA and even alternative operators have embarked on such investments*", it should be clarified that, to the contrary, not all operators will benefit from the same initial conditions, and that NGA supported services do not constitute a new market, but instead should be considered as an evolution of markets 4 and 5 - whose definitions include the use of optical fibre - whereby such services remain comprised by markets which remain subject to *ex-ante* regulation. This may lead to the imposition of obligations on entities holding significant market power (SMP) in such markets, including but not limited to, the imposition of equal access to conduits - essential infrastructure for NGA investment. In this respect note is also made of the comments of the European Commission in response to the analyses of markets 4 and 5¹⁹, in particular the call for ICP-ANACOM to impose remedies with respect to fibre optic access products, as appropriate, following the national consultation on NGA.

The issues of equivalent access will also be the focus of priority analysis by ICP-ANACOM, whereas, with respect to functional separation, it can be reported that this Authority launched a tender on 17 December 2008 for the acquisition of a study on "Functional Vertical Separation in the Electronic Communications Sector"²⁰, whereas ICP-ANACOM does not have a position on the adoption of measures in this areas, which measures are not included at present in European sectoral legislation.

On the formation of a (single) entity to invest in the development of NGA and provide wholesale access so that all interested parties can provide services at retail level, and without prejudice to the analysis carried out in the specific section (2.2.7), it is noted that it is not within the remit of this Authority to determine the structure of the market, but only to define the minimum regulatory conditions needed to achieve the objectives of regulation and, ultimately, to ensure that the interests of the citizen (and the consumer) are upheld.

The other issues of concern raised by the majority of the organizations are connected to broader issues that go beyond the exclusive remit of ICP-ANACOM, such as procedures for access to the public domain of the State or local authorities for the installation of

¹⁸ By determination of 14 January 2009, approval was given to the final decision on the definition of product and geographic markets, evaluation of significant market power (SMP) and imposition, maintenance, amendment or suppression of regulatory obligations in relation to the market for the supply of wholesale network infrastructure access (physical) at a fixed location (market 4 of Commission Recommendation 2007/879/EC of 17 December 2007) and the market for the supply of wholesale broadband access (market 5 of the same Recommendation). See: <http://www.anacom.pt/render.jsp?contentId=812378>.

¹⁹ See: http://www.anacom.pt/streaming/EC_comments_pt_2008_0850.pdf?contentId=812399&field=ATTACHED_FILE.

²⁰ See: <http://www.anacom.pt/render.jsp?categoryId=304695>.

infrastructure (including the system of Municipal Fees for Rights of Way, MFRW), restrictions on access to infrastructure owned by the entities referred to in paragraph 5 of Article 26 of the LEC and schemes governing access by operators to buildings, mainly linked to the regime applicable to the design and installation of telecommunications infrastructure in buildings (ITED), and the development of technical standards with respect to the constitution of the ITUR regime²¹.

Without prejudice to the general position which is presented, following the Resolution, these issues were addressed by ICP-ANACOM from the perspective of advisor to the Government, which is charged with examining and legislating on these matters²².

It is noted that ICP-ANACOM has already fulfilled the mandate of the Government within the deadlines established by the Resolution, continuing to work on specific aspects of these issues (e.g. ITED).

The specific issues raised in the consultation document are examined in the following sections.

2.2 Answers to specific questions

2.2.1 Introduction

Question 1: What do you anticipate as being the possible needs for greater bandwidth on the part of consumers, particularly in terms of (new) services offered and “*downstream*” and “*upstream*” speeds?

Most of the entities which responded to public consultation anticipate a greater need for downstream and upstream speeds, together with a tendency towards symmetry.

The greater need for bandwidth is, according to these entities, driven by factors which include the emergence of triple and quadruple play solutions (including high-definition television, “time shift TV” or VoD), in interaction with new content, new types of economic and social interactivity and communication between users, particularly in areas of health, education and various public services. ERICSSON and VODAFONE added that the demand for higher quality with respect to existing services will lead to demand for greater access bandwidth. In this respect, ZON also anticipates a decline in contention rates²³, as the levels of access capacity approach the actual service capacity.

²¹ installation scheme for ITUR telecommunications infrastructure in urban developments.

²² With the exception of the ITED regime, which is regulated by Decree-Law no 59/2000 of 19 April, but which is based technically on the ITED Manual and associated procedures adopted by ICP-ANACOM.

²³ With respect to broadband access, this corresponds, in practice, to the ratio between the speed of access actually provided to the end-customer in situations of increased network use and the contracted speed (Theoretical maximum speed).

According to the entities that responded to the public consultation, the tendency towards symmetry is driven, in the residential segment, above all by applications that are based on the *Web 2.0*²⁴ and the expansion of online gaming²⁵ and that its expression, according to SONAECOM, is limited by current limitations of bandwidth. In the business market, symmetry will be primarily driven by VoIP communications and corporate work (remote access to VPN, multimedia teleconferencing and teleworking).

For specific values given in respect of the speeds required by the market:

- PT, in line with "Moore's Law" applied to the speed of Internet access²⁶, estimates that at the end of 2009, the market will aim to provide 30-50 Mbps and at the end of 2010, speeds of 100 Mbps. However, it believes that this "expectation" may change due to forces of "competitive tensions".
- According to ERICSSON, developments in advanced markets such as Japan and South Korea, show that even symmetrical access up to 1 Gbps, initially offered to a small number of intensive users, are gradually becoming more common. It can therefore be envisaged that in regions where there is less competition, bandwidth should remain between 2 and 50 Mbps, with symmetrical access between 100 Mbps and 1 Gbps being standard in other regions.
- FCCN indicates a reference value of 100 Mbps.
- ZON envisages, in a time horizon of 3 years, needs for bandwidth of between 30 and 100 Mbps downstream²⁷ and between 2 to 10 Mbps upstream²⁸.
- SONAECOM cites studies in which data concerning the consumption of bandwidth in the case of fibre optic scenarios points to a 320% increase in download traffic and a 340% increase in upload traffic, compared to the current ADSL associated profile.

Also according to SONAECOM, possible technical constraints on the current network might be an obstacle to the growing demand for bandwidth, to the clear detriment of the development of a latent demand which is now beginning to appear. According to data from studies identified by SONAECOM, there are strong indications that the capacity of the ADSL and coaxial cable in the last mile will reach its limit within the next 5 years.

²⁴ Particularly for services such as MySpace, YouTube or Second Life, which during a growth phase already represent a significant percentage of total Internet traffic in the United States.

²⁵ SONAECOM comments that currently MMOG (Massive Multiplayer Online Gaming) easily reaches 100 perabytes of traffic per month.

²⁶ "The reference speed tends to double every 18-24 months". According to PT, drawing a comparison to the computer industry, the greater the speed of Internet access and quality of service provided, the greater the incentive to develop new applications that in turn require higher speeds and quality of service, resulting in a vicious cycle. This interdependence between the development of services and development of available bandwidth is also mentioned by VODAFONE.

²⁷ Mainly motivated by VoD services.

²⁸ In the latter case driven by services such as P2P, video and *photo sharing*.

To the various entities that responded to the consultation, NGA therefore provides a response to the growing needs of end-users.

The most notable exception to this general view (of the growing needs of bandwidth) is SGC, which identifies a wide disparity between the speeds currently offered by providers of Internet access service and the actual needs of customers, i.e., it believes that the capacity offered still exceeds demand.

Question 2: To what extent can the expected developments in data compression algorithms alleviate the need for increased bandwidth, without compromising the expected and necessary increase in data transmission capacity?

The majority of the entities that responded to this question²⁹ reported that the development of data compression algorithms will not alleviate the need for increased access network capacity in any significant way. In particular, according to PT, this issue has more relevance to FTTCab solutions than to FTTH solutions, since in the case of the latter, bandwidth potential is substantially higher and therefore there is less need for compression mechanisms.

PT states that, currently, the major factor driving the need for increasingly high speeds in access networks consists of services with a video component, including IP-TV, where any data compression algorithms will obviously have an impact, allowing more standard definition (SD) or high-definition (HD) channels to be supported, along with data and voice, over the same connection. However, for PT, it is not possible to predict the real impact of future algorithms on the access network, given that its meo service uses state of the art. Thus, while the percentage of HD channels can be expected to increase, creating needs for more speed, it does not expect to use another type of compression in the medium term. According to PT, the rate at which new channels/content become available will, more than likely, outstrip gains derived from compression algorithms.

ERICSSON also takes the view that the rate of provision of new services (HDTV, photo and audio) has exceeded the development of compression technologies.

FCCN indicates that compression techniques are already used simultaneously at various levels of communications and therefore their combined efficiency tends to not bring additional benefits and is, on the other hand, a factor which inhibits quality.

This view is shared by COLT, which warns that excessive compression can compromise the data to be transmitted.

²⁹ In particular, PT, ERICSSON, COLT, ONI, FCCN, SONAECOM, GSC, ZON and VODAFONE.

Similarly, according to VODAFONE, although currently available technologies allow for greater compression of data, voice and video, new types of service³⁰ require increasing bandwidth and better quality. VODAFONE's view is that the evolution of different services and competition in the same channel will limit the optimization of algorithms, and that these services may therefore reach a limit, making future optimization impossible and therefore limiting the development of new services.

ONI comments that data compression algorithms have made it possible to meet demand for content with large volumes of information (e.g., photographs and video), enabling the transmission of content over networks of limited bandwidth. However, ONI takes the view that these algorithms do not eliminate the need to develop networks in terms of capacity and transmission quality.

SONAECOM also considers it unrealistic to assume that the development of compression technologies might cancel out the effect of increased demand for bandwidth. In this respect, SONAECOM points to the growth seen in the levels of such demand³¹. It is therefore estimated that the bandwidth generated by future formats will be about 10 times higher than current HD and 100 times higher than current SD video.

According to the GSC and ZON, the use of more efficient algorithms, such as MPEG-4, may have some impact in reducing the needs for increased bandwidth. However, GSC, not foreseeing a dramatic change in demand for higher bandwidth services at a retail level, does not give importance to the development of these algorithms. Meanwhile, ZON takes the view that more efficient algorithms will result in the emergence of new types of products or services, leading to an increase in recorded traffic.

<p>Question 3: Do you identify, at the level of NGA, any aspects related to issues of security and emergency that warrant particular attention?</p>
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According to PT, there are no issues of security and emergency that are not already raised and addressed by the current generation of network. Regarding the overall security of the network, PT considers that, while important, the issue does not warrant special consideration in the context of this consultation.

However, with respect to the question of emergency situations, contrary to the copper network which is self-powered, guaranteeing uninterrupted access, PT points out that fibre

³⁰ Including IP-TV, HSI (High-speed Internet) and VPN.

³¹ The operator presents the following data: using the current codec MPEG -4, transmission of HD content requires from 8 to 18 Mbps, while it is expected that the new generation of 3D videos will require between 50 and 100 Mbps. Ultra High Definition TV (UHDTV), which is estimated to come onto the market in 2016, will have a resolution of 7680x4320, corresponding to 33 megapixels at 60 frames per second (16 to 32 times the pixels per second rate of current HDTV). A film in this format with a duration of two hours, even when compressed with MPEG-4, will generate a volume of about 360 gigabytes of data.

optic networks lack this characteristic, since the terminal equipment (CPE) is connected to the customer's electrical installations which are subject to possible failures. Thus, in a context of transition to NGA, PT considers it important that ICP-ANACOM promote debate and discussion with operators, manufacturers and consumers on this issue, especially on the issue of access to emergency services in the event of failure of the electric power grid, taking into account that there is not yet a stable solution that is acceptable to all involved³². PT also takes the view that we are undergoing a profound change that will change the way we communicate and how we use the various services and features associated with NGN. As such it is their opinion that it is not going to be possible to respond to new problems with traditional solutions and methods.

In any case, PT believes that users should be provided with all the information they need to form a correct perception of the operating conditions of the services.

According to CPEC, NGA raises a set of potential challenges³³ - which have proved very complex to resolve - and pose greater difficulties in terms of security, in view of the need to ensure a set of functions which are essential for its proper operation³⁴. It is foreseeable that these functions will depend on the equipment associated with access networks, in particular CPEs and network equipment needed in any of the possible configurations (e.g., FTTH/B or FTTCab).

In this context, although CPE falls outside the scope of this consultation, CPEC takes the view that its capabilities in terms of control of security³⁵ calls for particular attention. With respect to the network equipment to which CPE is connected³⁶, in view of CPEC, if on the one hand, their dispersion makes them more vulnerable to physical attacks and local power cuts, on the other hand, their concentration will result in increased vulnerability to non-scheduled incidents (fires, terrorist attacks, etc.). A similar situation may occur, according to CPEC, as regards the sharing of conduits, obliging the concentration of transmission systems and leading to a consequent increase in their vulnerability.

According to the position of CPEC, future electronic communications (access) infrastructure will, as applies to present infrastructure, be seen as critical infrastructure, on which the dependence of other infrastructures will continue to increase, whereby, from the outset and

³² For example, PT comments that the provision of independent energy units or the adoption of common solutions at an apartment block level or for new developments increase the costs incurred not only by the operators but also by end-users.

³³ These include user and application identity theft, issues of privacy and unauthorised distribution of content, denial of service (DOS), safety standards and difficulty in maintaining integrity.

³⁴ Such as authentication and access control, non-repudiation, confidentiality, security of communications, data integrity, availability and privacy.

³⁵ In particular, authentication and access control, encryption/decryption of data, and recognition of emergency calls.

³⁶ Which, according to CPEC, there should be security routines capable of validating communications and neutralising (or at least minimising) "logic" attacks, both from terminal equipment and from the network itself.

with the involvement of all relevant stakeholders, a number of initiatives should be put in place in order to identify any constraints arising from the use of these new networks³⁷.

CPEC comments that migration to the NGA will hamper the provision of some services, particularly access to emergency services³⁸ and the possibility of lawful interception of communications. In terms of access to emergency services, technical solutions to resolve the issue of nomadism exist only in the medium to long term. Consequently it argues that it is essential to implement the position on this matter agreed in the ERG³⁹. With respect to legal interception, CPEC indicates that existing solutions cannot be applied in the case of the NGA, and that it is essential that these networks comprise solutions that safeguard and guarantee the security of the State. As such, any solutions to resolve this issue (which, in CPEC's view, will focus on local access and will likely be complex and costly) should be an integral part of the provision of services.

GRA considers that it is important to ensure that "the possible opening up of the networks" does not cause problems in terms of data security and availability of service. On this issue, GRA also indicates that there should be continued compliance with the requirements associated with access to emergency services (112).

ERICSSON also draws attention to the fact that NGA is increasingly dependent on the customer's active equipment⁴⁰, arguing that attention should be given to the question of supplying power to this equipment and procedures in emergency situations.

FCCN comments that the increase in the bandwidth could result in greater potential for certain users to carry out attacks of the type Denial of Service (DoS) or similar. In this regard, FCCN advises that special care be taken in contracts so that operators are able to take corrective measures with regard to improper behaviour, whether intentional or not.

³⁷ In particular:

common definition, identification and prioritization of critical services in the event of serious incidents and the preparation of plans for their restoration;

formulation and implementation of procedures to prioritise communication capabilities (e.g., RNSI or SIRESP);

evaluation of how NGA could impact interdependence between the communications sector and other critical infrastructure;

establishment of agreements for sharing information (including records of incidents) enabling the protection and rapid restoration of critical infrastructure;

development of consensus among the various operators for the development of programmes to test interconnection between different networks (NGN and existing networks); and

use of a set of common standards to avoid problems of interconnection and interoperability between different networks and equipment.

³⁸ In fact, according to CPEC, access to emergency services is problematic with these networks due to fact that they are not attached to a fixed location and can move around easily (nomadism).

³⁹ That is to say, "VoIP emergency calls made from fixed or known locations, should be routed to the nearest emergency centre to the base of the contractually agreed physical address; when an emergency number is called, information on the location of the caller must be provided, as long as this technically viable. Where the location of the caller cannot be determined by the VoIP service provider (especially in case of nomadic use of VoIP services), the end-user should be informed clearly and without ambiguity by the provider of VoIP services as to the existence of any constraints on the routing of emergency calls and the provision of information on the location of the caller, as well the potential consequences of such limitations".

⁴⁰ Especially the optic modem/receiver set.

In the opinion of ZON, fibre optic NGA will, from the outset, be more secure than copper access networks. However, limitations in terms of power supplies to terminal equipment may, according to the company, hamper access to emergency services. In view of the evolution of the provision of retail services, particularly in the area of security (e.g., home automation), ZON supports the implementation of solutions that overcome this problem, especially measures which maintain and improve ease of access to emergency services.

SONAECOM emphasizes the importance of making the current regulatory rules associated with the use of geographic numbers for the provision of VoIP services compatible with the development of wholesale offers in order to ensure that the holder of numbering can control the fixed nature of the use of such numbers. In particular, SONAECOM states that in the context of bitstream offers, it can become impossible for the provider in possession of the numbering (beneficiary of this offer) to comply with this type of obligation, whereby it should be ensured that sectoral regulation provides for third party (the holder of the network and wholesale provider) responsibility with respect to compliance with this obligation of the holder of numbering⁴¹. Therefore, according to this operator, the urgent need to resolve this issue is not only a question of NGA, but arises from the needs of today's market, for which current regulation does not provide an adequate response.

ONI also takes the position that the main foreseeable problem is related to the location of users of nomadic services

Meanwhile, VODAFONE takes the view that, regardless of the technology or topology associated with NGA, it is important to ensure a set of mechanisms which protect and safeguard the information regarding the traffic of each customer and user data. In this particular respect, VODAFONE does not foresee any issues related to security and emergencies that warrant particular attention in the deployment of NGA.

COLT also believes that there are no security and emergency issues that are distinct from current issues.

It is noted that ALCATEL-LUCENT requested that the entirety of its response to this question be considered confidential, whereby the choice was made not to publish or summarise it.

Position of ICP-ANACOM

The expectations that ICP-ANACOM has already presented in the consultation document on the development of broadband access services, specifically with respect to bandwidth, are confirmed and reinforced by the responses of most of the entities that responded to the present consultation.

⁴¹ SONAECOM states that this situation is similar to the situation faced today with respect to corporate offers, particularly with regard to the technical difficulty of ensuring the fixed use of numbers for large clients who own and control private communications networks (VPN), which provide support to the voice service provided by the service provider of public use communications.

There appears to be a growing consensus on the supply and demand (even though in the short-term demand is not yet the most visible driver) for higher downstream and upstream speeds, with a tendency towards symmetry. Indeed, it appears that an initial reference value for NGA seems to be emerging: 100 Mbps⁴².

This need for greater bandwidth in access networks is inevitable and progressive because, as mentioned by several entities, new services/data volumes have been made available at an increased rate. It is recognised, however, as noted by some of the entities that responded to the public consultation, that there will be an interdependence between the conditions provided at the level of the access network and the development of services and applications which benefit from these conditions.

A further important aspect to be taken into consideration is the expected increase in actual speed of access offered to the user, whereas it is also desirable to achieve an effective reduction in contention rates, with the real speed of the service approaching the contracted (potential) speed of access. Indeed, the high capacity of fibre optic networks may also result in a reduction in current contention rates⁴³, provided that operators adapt their *core/* transport networks and (e.g., international) Internet connectivity capacity. It should be noted that an effective contention rate of 1:50 (theoretical maximum rate for certain classes of the current bitstream offer⁴⁴), applicable to aggregated wholesale access (*core* network), results in practice and in the worst case scenario, that 100 Mbps access guarantees minimum provided speeds of no more than 2 Mbps (100:50), far from being considered a "next generation" service.

Besides this evolution in levels of speed it is also important that new and innovative services emerge, e.g., real-time multimedia services (medical and family assistance for all generations - telemedicine, entertainment of the younger and older generations - "online" games and IP-TV, video-security), corporate work (teleworking, "e-learning", "e-government") and "cloud computing" with distribution of processing capacity in new networks.

In other words, investment in NGA appears to be important for the development of the Country and for the satisfaction of certain needs of citizens. Therefore, ICP-ANACOM will focus its attention on creating conditions that both encourage investment in NGA and promote competition, making it possible for citizens and businesses to gain access to more and better services.

Furthermore, the development of data compression algorithms should not, according to the responding entities, provide any significant reduction in the need to increase the capacity of access networks, since these algorithms have been developed to accommodate the

⁴² This may reach 1 Gbps for downstream (long term) or less for upstream.

⁴³ See in this respect, ICP-ANACOM's report, "Evaluation of the Internet Access Service" of February 2008: <http://www.anacom.pt/render.jsp?categoryId=268684>.

⁴⁴ RAPT, PTC's reference wholesale offer for broadband access.

transmission of content over networks with limited bandwidth. This is a position which ICP-ANACOM shares.

Additionally, it is expected that while new compression algorithms will emerge that are more efficient, these will be associated with new products or types of services⁴⁵, which could extend the life of some current technologies without undermining the urgency and need for investment in NGA.

The issues of security and emergency situations, while important for protecting the interests of citizens, does not seem, in general and also according to several entities, to raise any special or significant concerns, arising specifically from the evolution towards new fibre optic based networks.

However, there were entities that raised several questions. With more detail, CPEC took the view that the majority of the challenges and concerns about network security (including data and network security and integrity, authentication and interconnection), while their examination is important, are primarily related to core networks and not just an NGA scenario. In fact, the "greater difficulties in terms of security" cited by CPEC, are already experienced in current networks (core) IP and the functions which are essential to ensure are already a necessity (in existing networks), particularly with regard to the characteristics of nomadic use.

For questions related to terminal equipment (CPE), attention should be given to the issue, as mentioned in several responses, of uninterrupted access⁴⁶ which cannot be guaranteed in NGA, since the equipment is connected to the electricity networks of the customer premises and these networks are susceptible to possible failures (i.e., the terminal equipment is not powered remotely from the exchange⁴⁷).

In this context of evolution towards NGN/NGA, ICP-ANACOM agrees with PT on the need to examine the issue of access to emergency services, "*taking into account that there is not yet a stable solution that is (commercially) acceptable to all involved*".

In any case, ICP-ANACOM takes the position that users should continue to be provided with full information in a clear and timely manner on the operating conditions of services, especially with regard to access to emergency services and any constraints applicable to this access. Where there are potential restrictions in access to the service, including the foreseeable absence of self powered systems on fibre optic networks, end-users should be informed of this and operators must also give indication of possible options for the prevention of any disruptions to service for reasons connected to power cuts (e.g., use of

⁴⁵ It is noted that the "pure" transmission of UHD TV frames will, from the outset, require speeds of about 16 Gbps.

⁴⁶ Especially in case of emergency.

⁴⁷ As can current occur with the copper network (given the increasingly common the use of terminals which are not power supplied over the network)

batteries, UPS, etc.). The aim must be to ensure that, at a minimum, users of NGA services have access to the emergency services (by making a call)⁴⁸.

However, this issue is not entirely new and has been previously discussed, for example, in the consultation on the regulatory approach to voice services based on IP technology (VoIP)⁴⁹. Even in a possible scenario in which the voice services are supported primarily on NGA (VoIP) and mobile networks⁵⁰, it will be necessary to provide solutions that allow, for example, citizens with a higher level of need and/or the most vulnerable (children, the elderly or people with health problems) to remain contactable and, especially, locatable and also to ensure that they are able to reach the emergency services in the event of a power cut.

With respect to the possible need to make the rules associated with the use of geographic numbers for the provision of VoIP services compatible with the development of wholesale bitstream offers (given the nomadic "nature" of the service and the difficulty in locating the user), ICP-ANACOM takes note of the issue, which is not a new one, whereby it should be considered and resolved in another forum.

It is recognised, however, that the question of user location is important, not only in the operation of wholesale offers, but also in access to emergency services, and that it is fundamentally important to ensure that emergency switchboards have real time access to the exact location of the terminal so that necessary emergency care can be provided to citizens in a timely manner. This is a topic of ongoing discussion in the field of NGN, and as such it is likely that standardized and affordable technical solutions may become available in the near future. Indeed, this is not just a regulatory issue, but also a technical issue, that operators and the entities involved, especially standards bodies, are called upon to resolve.

In conclusion, ICP-ANACOM notes the wide range of issues which the respondents have raised regarding security and emergencies, and it appears that these issues are more wide-ranging, both in terms of (i) networks, services and applications with different levels of concern for security and emergencies; (ii) the interdependence between sectors; or (iii) the

⁴⁸ While currently, the high coverage of mobile networks can offer, in most situations, this guarantee (e.g. today, more than 50% of calls to112 are placed from the mobile networks). On the other hand, the question of user location remains.

⁴⁹ The report of the consultation stated that: "Some of the technological solutions currently being considered to solve this problem focus on auto-supply systems and on solutions supported by the local network, which are still too poorly developed and too costly to be attractive. On the other hand, the increased use of terminal equipment that is not tele-supplied by other services (e.g. DECT), and not subject to any type of requirement in this domain, is leading to a de facto situation that remains indeed unchanged with the introduction of VoIP terminals. Thus, considering that VoIP service providers will tend, in their own interest, to look for solutions that minimize the problems inherent to the use of the current non tele-supplied terminals and also the appeasing effect of other ways to access emergency services, it is ICP-ANACOM's position that it should not establish, for the time being, any specific requirement on the use of VoIP terminals that are not tele-supplied."

See:

http://www.anacom.pt/streaming/rel_voip.pdf?categoryId=183082&contentId=336988&field=ATTACHED_FILE.

⁵⁰ Whose terminals, even where they have batteries with a high level of autonomy, need electricity to charge them.

responsibilities of public and private entities, which are charged with responding in order to satisfy the most basic needs of citizens, in terms of security and emergency situations.

Finally, this is a topic which ICP-ANACOM is considering address in a possible consultation to be undertaken independently in the future, focusing in particular on the development of the regulatory framework.

2.2.2 The access market

Question 4: How do you view, in general terms, the competitive situation regarding the access network in Portugal?

According to the view taken by PT, the competitive situation of the access network in Portugal has evolved significantly, especially with the spin-off of ZON, which has introduced an unprecedented level of competition and the effects of which have altered the paradigm of competition in the market (in particular the access market).

PT identifies a significant level of growth in the cable (access) network⁵¹ and in unbundled loops⁵². As a consequence, PT argues that the alternative operators already have a number of accesses and a level of coverage that ensures stable and sustained access to end-customers which is independent (with respect to PT). According to PT, such indicators suggest lower barriers to entry and to free competition and a capacity to construct NGA⁵³, without limitations due to a lack of capillarity (with the guarantee of access to conduits) or geographical presence, whereby the operator argues that it should not be subject to discrimination in comparison to other operators.

PT also states that NGA will not be installed across the country in the matter of a single year and "blank areas" may persist, subject to the intervention of the public authorities⁵⁴. As such, commenting that the cable operators have limited geographical coverage and that the operators supported by the LLU are dependent on it, PT argues that the way ANACOM is viewing the issue suggests an intention to attach the NGA to the historic network. According to the position taken by PT, the evolution to NGA by the various operators should correspond to a change in the regulatory paradigm which has focused on the copper networks.

⁵¹ According to PT, there are approximately 4,131,000 cabled households out of a total of approximately 5,520,000 households, representing an increase of more than 30% between the 1st quarter of 2007 and 1st quarter of 2008.

⁵² With a growth rate of over 50% over the same period.

⁵³ In areas of greater population density, greater commercial activity and greater demand for advanced and innovative services.

⁵⁴ According to PT, at this stage, it falls to the operators "*to play the local game*" and not "*to play the national game*".

According to PT, the "proof" that the operators have all the conditions needed to install NGA, covering most of the population, is derived from the fact that SONAECOM and TVTEL are developing fibre optic networks, demonstrating that the specific characteristics of NGA enhance the ability of operators that invest in local solutions to build NGA.

ERICSSON considers that all current access technologies have been implemented and are available in the Portuguese market.

GRA indicates that the competitive situation has evolved significantly in a positive way. Nevertheless, it comments that an effort continues to be necessary in order to give impetus to the "*processes of operator switching*".

FCCN mentions that until recently, the competitive situation in Portugal in terms of the access network was almost unique (simultaneous activity on the cable and copper network, ensuring that this operator has a dominant position and constituting an obstacle to product innovation), noting that this situation has changed very recently. Meanwhile, CEGEA indicates that, at retail level, the coaxial cable and copper access networks could be integrated into a single market⁵⁵. According to this authority, the reasoning would be valid even in the absence of wholesale offers based on cable networks. In this respect, it concluded that in places where the cable network existed there was also competition with the copper network, and that this has been more visible since the spin-off of ZON. According to CEGEA, this relationship implies that there already exists (or might exist in the near future) separate geographic markets for the markets of broadband access.

COLT cites the comments on the issue of APs, arguing that there is a lack of equality in terms of access to the network, given that at present the dominant operator is under no obligation to share information on such points. It is also noted that PT has an advantage over the alternative operators, because it can shape and design the future access network as it sees fit and at its own pace.

SGC cites the following factors as being relevant, in addition to the historic copper access network of PTC:

- the mobile access networks, which it is noted have seen significant growth at the expense of granted incentives⁵⁶; and
- certain cable networks, with significant coverage and in respect of which GSC claims that, due to alleged technical difficulties, regulatory intervention was never put into practice.

SGC states that the timescale of processes which may allow the development of BWA access networks have been extended. SGC concludes, however, that in most of the

⁵⁵ In this regard, it mentions that OFCOM concluded that the existence of substitutability at retail level between the networks in question means that the same relationship is found at wholesale level.

⁵⁶ SGC identifies the existence of higher interconnection prices, lack of measures with respect to the mobile access market, permission granted to offers of the *homezone* type and the reduction seen in spectrum costs.

national territory and even where there are cable networks, there is insufficient competition at the level of access, and that the development of new networks (such as its Tmax network), irrespective of whether they are next generation networks, can help promote competition. It considers that this does not apply to the development of NGA by PTC, and even that there is a high risk of giving rise to a new monopoly. Therefore, SGC considers that it is essential to guarantee technical, procedural and legal conditions which enable any operator to expand its network in an effective and economic way, arguing, in this context, for functional separation as a means of ensuring that there is no discrimination at a procedural level in development of new networks.

According to ONI, competition at the level of the access network remains limited and highly dependent on the RUO. ONI believes that the cable networks are unregulated, primarily focus on the residential segment and, with the exception of the ZON network, have limited geographical coverage. Under these conditions, ONI indicates that the alternative fixed network operators have essentially used the RUO as way of reaching the residential and corporate markets. It recognises, however, that there a number of exceptions with operators constructing their own access networks (limited to particular cases which justify the investment⁵⁷).

According to ZON, the competitive situation at the level of the access network has seen significant progress in recent years as a result of a regulatory framework which is more conducive to the promotion of competition and more intense regulatory pressure at the level of wholesale markets. However, ZON argues that greater retail competition is mainly supported by regulated wholesale offers based on the copper network of PTC, which would have a particular impact on the structuring of broadband services. Therefore, ZON agrees that the historic network still constitutes a "*fundamental resource*" for the provision of such services. This high dependence on a single access network calls for a cautious regulatory approach to relevant markets during the migration from the copper network to the NGA of PTC. In this respect, ZON argues that, given the characteristics of the Portuguese market, the transition to NGA, which will bring new network architecture, should draw additional scrutiny by ICP-ANACOM, in order that investments already made by alternative operators based on the current network architecture are not put at jeopardy.

ZON also raises the issues of (i) the importance of ensuring equal access to essential assets, such as conduits and (ii) the challenge of closing the gap between urban and rural areas with respect to the availability of services and bandwidth⁵⁸.

In line with the position taken by SGC, ZON also considers that it is still not possible (due to uncertainty about the date of future spectrum allocation) to take into account the future role that BWA will be able to play in shaping the expansion of the broadband market and in the

⁵⁷ For example, access to condominiums, business parks or large corporations.

⁵⁸ These issues are detailed in specific sections.

mass roll-out of very high speed offers, especially with respect to its usefulness in areas of lower population density⁵⁹.

According to SONAECOM there have been constraints in Portugal on the development of networks providing an alternative to the copper networks and cable networks held until recently by PTC. SONAECOM presents some historical considerations which, according to the operator, contributed to this situation, and it identifies current economic constraints associated with the replicability of existing networks, including sunk costs and economies of scale and the historical relationship which PT has with society, as well as a lack of awareness among the general public, which grants it greater ease of access to buildings for the installation of infrastructure⁶⁰.

In the light of this context, SONAECOM believes the fixed access network market is dominated by PT. Despite the recent spin-off of ZON, SONAECOM believes that this domination persists, particularly when one considers the essential network resources which PTC possesses and which allow PTC to effectively control the capacity for replication by third parties of the capillarity of its access network. However, for SONAECOM, the importance of this network could be lessened if there were no constraints on access to conduits by alternative providers⁶¹.

SONAECOM adds that the lack of comprehensive information on existing infrastructure, as well as restrictions associated with access to buildings, continue to constitute severe constraints to the development of alternative access networks. It is of the view that discrimination in favour of PT, as regards the use of resources under its management, leads to an effective exclusion of potential competitors, including with respect to access to the value chain under equal terms.

Given the importance of these factors, in order that real alternatives to the access network of PT can make a presence in the national market and to be truly competitive, SONAECOM argues that the competent authorities must act in order to eliminate these constraints.

According to VODAFONE, the competitive situation at the level of the access network in Portugal raises concerns. In fact, according to VODAFONE, the market analyses and available statistics show that PT is dominant in the services provided over the copper network⁶². VODAFONE considers that in terms of access, and as a result of the technological specificity, cable networks, by not permitting third party access and by not

⁵⁹ However, it considers that the technologies encompassed by BWA could constitute an important and positive factor in the development of alternative infrastructure and, in this respect, make an important contribution to the reduction of barriers to the high speed provision of data.

⁶⁰ It notes, in this respect, that even today there are condominium owners who believe that the communications network installed inside their building is the property of PTC and PTC alone can authorise intervention.

⁶¹ According to SONAECOM, there are shortcomings in the provision of access to conduits which hinder and delay the development of alternative networks, in particular regarding the scope of the offer (which does not include, for example, installation of poles), procedures for the clearance of blockages and control of occurrences of non-compliance.

⁶² With the exception of subscription TV which is dominated by the cable networks.

having wholesale offers, represent a competitive limitation in the offer of wholesale electronic communications services. The company adds that, due to their geographical concentration and reduced capillarity, they might not even be considered real competitors to the copper networks.

Question 5: How do you view the development of other access networks, including the coaxial cable network? Is it foreseeable that this network will (also) evolve into NGA supported by fibre?

NGA is not according to PTC, an attribute that is exclusive to the copper networks and much less the historic network. NGA can be developed on different access platforms, such as mobile networks and other wireless solutions (in particular BWA) and the cable networks, which play an important role in the area of fixed and nomadic solutions, covering more than 80% of housing and being dominant in some areas of higher population density.

According to PT, the advantage of cable (with effective power in terms of national and international content, including a variety of exclusive content) is today more relevant and crucial, with regulatory pressure falling on the historic network, imposing access obligations, while the cable networks are not regulated. PT notes that the cable operators started their business by offering television, won a dominant position in this market, and subsequently incorporated broadband Internet access and, today, have added voice, as a commodity⁶³. According to PT, this change in the business paradigm favours the cable operators. In this respect, PT believes that the weight of the cable networks must be properly assessed and taken into account in ICP-ANACOM's regulatory actions, highlighting also the issue of access to content⁶⁴.

PT states that the hybrid fibre-coaxial network (HFC) has a high degree of capillarity in terms of the fibre optic section, whereas the coaxial cable sections are relatively short. As such, it considers that the operators in possession of HFC networks could easily proceed with the evolution of their networks to a fibre optic architecture⁶⁵. Indeed today, in the opinion of PT, the offers of operators with HFC networks are in open competition with the broadband offers of other fixed network operators, holders of fibre optic networks and/or copper, which are natural candidates for NGA development⁶⁶. Furthermore, it considers that the cable

⁶³ Initially cannibalized by mobile voice services and now attached to new kinds of services, with IP integration.

⁶⁴ According to PT, even if the vertical and horizontal barriers are overcome, if the barrier of access to content is not overcome, ZON, as the largest distributor of content in the national market, will have a significant competitive advantage over the other operators.

⁶⁵ According to PT, the cable networks are typically hybrid networks, using fibre optic (between the operator exchanges and the optic nodes) and coaxial cable (a half share). This network has the potential to evolve, with currently installed infrastructure, to the provision of speeds up to 400 Mbps downstream and 108 Mbps upstream - Standard DOCSIS 3.0, which corresponds to ITU-T Recommendation J.222, ratified in July 2007.

⁶⁶ PT commented that Comcast Corporation, the largest cable operator and second largest provider of broadband Internet access in the USA has been responding to Verizon (FTTH) by doubling the speed offered to its customers and has expressed its intention to incorporate the DOCSIS 3.0 on its network.

operators will have an advantage in terms of the occupancy of the infrastructure of buildings. PT also mentions the example of the USA⁶⁷ to show that in terms of market and technological development, the cable operators have all the conditions in place to develop a sustainable strategy of approach to NGA, through the reconfiguration of the access network⁶⁸ and the transition to DOCSIS 3.0⁶⁹.

In conclusion, PT takes the position that the cable operators can and will develop NGA, just as the copper network operators, and that therefore a monopoly of access infrastructure is unlikely, in view of the fact that there various platforms, including in particular cable networks, which are capable of supporting this evolution.

According to ERICSSON, assuming that all broadband access networks will evolve into much higher capacity networks⁷⁰, the following networks may be classified as NGA (depending also on the extension of fibre optic):

- mobile broadband, which will evolve into HSPA, and subsequently to LTE, offering 50 to 100 Mbps;
- cable, evolving to bandwidths of 100 to 400 Mbps with DOCS 3.0;
- copper, which will support speeds of 100 Mbps (or more) with new modulation schemes; and
- fibre optic (GPON and point-to-point), which will evolve to *Gbit Ethernet* (> 1 Gbps).

As the next step in bringing fibre optic to the home, ERICSSON foresees the development of radio access points (mobile) and FTTCab (VDSL2 and DOCSIS 3.0).

CEGEA comments that the typical topology of a cable network is very similar to FTTCab topology⁷¹ and it considers that cable networks are perfectly capable of competing, in terms of speeds, with the next generation networks associated with the current copper network (FTTH and FTTCab). CEGEA also indicates that the evolution for DOCSIS 3.0 technology implies investments and upgrades to terminal equipment, although these are less than those

⁶⁷ According to PT, cable networks in the United States have reached a very important level in the communications market and the FCC has chosen to release the various incumbents from their obligations in terms of loop unbundling and bitstream, creating a framework providing incentive to competition in terms of investment in sustainable alternative infrastructure.

⁶⁸ Given the increase in Internet access subscribers and traffic, to increase access capacity, PT states that cable operators should increase the number of optical nodes (which convert the signals between the fibre and coaxial cable) and place them closer to the users (FTTCab with street cabinets, FTTB with the optic nodes at the building base or FTTH fibre to home, where DOCSIS cannot be used, but for example Ethernet can be used).

⁶⁹ Also according to PT, this protocol allows very high transmission speeds, greater security and other improvements (such as IPv6 support), thereby allowing cable operators to offer speeds to the order of hundreds of Mbps, and potentially reaching Gigabits per second.

⁷⁰ Core network core and backhaul in fibre optics.

⁷¹ In this respect CEGEA also mentions that DOCIS 2.0 support technology enables up to 50 Mbps of traffic downstream and up to 30 Mbps of traffic upstream, allowing evolution to DOCS 3.0 technology providing, respectively, speeds of 220 Mbps downstream and 120 upstream.

associated with the construction of the networks themselves. It also argues that the technological evolution of the cable network will be more gradual than the evolution of the copper network.

RGA considers that there is a tendency, in a first stage, to exhaust the technological capabilities of the cable networks and, after that period, there will be a change. RGA believes that the core of the cable network already constitutes a next generation network.

According to COLT, other access networks will evolve into NGA, provided that there are appropriate and proportionate rules for all market players

ONI expects that the mobile network will continue to evolve to higher speeds and more services. However, given the limitations of the means of transmission, ONI takes the view that it will not be able to compete with fixed networks in terms of access speeds and therefore it can be expected that the distinction between the two will continue to be convenience of mobility. According to ONI, it is possible that alternatives will emerge based on BWA. However, given the constraints of the market, it believes there are serious doubts about the success of these networks, in the event that there is a lack of proper coordination with other regulatory measures related to mobile services and spectrum use.

It can also be expected, according to ONI, that, in the light of the bandwidth required by new services (e.g., HDTV and VoD), existing cable networks will also evolve into solutions supported by fibre optics.

According to ZON, the cable network is evolving supported by two pillars: (i) extending the spectrum of coaxial cable use, (ii) developing services which use the bandwidth of the shared customer access component more efficiently⁷². Therefore, in the opinion of ZON, the natural evolution of a cable network cannot lead to NGA based on fibre optic. This is because the greatest needs for bandwidth lead to the sharing of available spectrum by a smaller number of users, and therefore the trend towards increasingly smaller cells leads to greater limitations on the cable network.

SONAECOM believes that the evolution of the current cable network to a fibre optic network over time, is assured, due to the intrinsic limitations of coaxial cable and historical limitations imposed by DOCSIS architecture. For example, SONAECOM states in current PON networks, a signal can be transported over more than 20 km without regeneration, whereas, in comparison, a coaxial cable typically requires an amplifier each 500 meters. SONAECOM further states that the operational costs of fibre optic are substantially lower than those of coaxial cable.

With regard to the architectural aspects, while recalling that DOCSIS had its origins in broadcast television networks, SONAECOM comments that around 80 Mbps is shared by at least 250 customers per node, i.e. around 320 Kbps per customer⁷³. With the advent of

⁷² Digitalisation of the TV service: DVB-B; SDV and DOCSIS 3.0.

⁷³ Indicating that where there is a higher number of customers, there is a proportional degradation in quality.

DOCSIS 3.0, SONAECOM states that speed is increased to 200 Mbps downstream, while upstream speeds are not expected to be higher than with DOCSIS 2.0 before 2009. SONAECOM envisages that only then will it be possible for upstream to be expanded to 100 Mbps, while always shared by the customers of each cell. According to SONAECOM it is here that the difference lies between the commercial proposal and the real capacity to deliver truly superior services that effectively meet the product specifications which are not limited or restricted by the technology⁷⁴.

Accordingly, SONAECOM expects that the development of networks by cable operators consisting entirely of fibre optic, will make sense first of all in areas of new construction, at the same time as the trend towards DOCS 3.0 will provide a degree of defence, if limited, during the initial development phase of competing fibre optic networks.

Vodafone believes that the cable networks, through significant investment, may also eventually evolve into a form of NGA. According to VODAFONE:

- on the one hand, due to the evolution of the market itself and of offers supported on future FTTx networks, the cable operators may have to match their offer of services in terms of technological development, quality of service and features of offers supported using fibre optic networks; and
- on the other hand, a significant part of cable networks comprising HFC architecture, has been based on fibre optic from inception, whereby their networks hypothetically have the flexibility (during an early stage of the evolution of demand for bandwidth) to support higher speeds than those allowed by copper network.

The evolution of HFC networks to an NGA architecture, even if theoretically possible, is not, according to VODAFONE, free of technological problems and would entail considerable investment, including the replacement of much of the coaxial network and increasing the capillarity of the optic component, or even replacing the distribution network which is based on analogue technology.

VODAFONE concludes that due to an absence of significant investment and development by cable operators, some of which have a limited geographic footprint and, possibly, lack the financial strength to make such investments, it cannot be assumed in the present context, that the evolution of these networks to an NGA topology will take place.

Position of ICP-ANACOM

ICP-ANACOM confirms the growth in the coverage of the coaxial cable access network and in the number of unbundled loops, which would indicate, from the outset, a reduction in entry barriers and increased competition which is already evident in certain geographical areas, at

⁷⁴ SONAECOM notes that even with the development of technology to higher levels, the upstream direction remains a weakness for cable operators while linked to this historic architecture.

retail level. However, this growth (i) is mainly due to the network of ZON which was mostly developed when the operator was part of Grupo PT and (ii) does not directly imply greater "*capacity [of the operators] to construct NGA*", given that NGAs are based (entirely, over the long term) on fibre optic, accepting, however, the facilitative role played by effective and full access to the conduits of PTC⁷⁵.

Additionally, it is a fact that the cable operators, even while they have developed and may further develop their networks through access to the conduits of PTC, have more limited geographic coverage than the network of PTC and the alternative operators supported by LLU are naturally dependent on the wholesale offers of the operator with SMP (RUO and RCAO)⁷⁶. Accordingly, maintenance of regulation with respect to the historic network, besides the fact that it is held by an operator with SMP in several relevant markets, is derived from the current conditions on the ground, as well as from the view, confirmed by the undertakings responding to the consultation, including PT itself, that NGA will gradually evolve from certain geographical areas, operating (for a certain period) in parallel with existing networks. That is, existing networks and services will remain active in certain areas (more remote and less populated areas) for that period.

It is noted, as referenced by FCCN, that until recently there was a different competitive situation, whereas, as recognised by most of the entities that responded to the consultation, the spin-off of ZON introduced positive developments in terms of competition into the markets, both in the broadband markets and more recently the markets for voice and television services; an issue that is also recognized in respect of the recent analysis of market 5.

It is further recognized, as emphasised by some operators, that these developments, while positive, were not sufficient to achieve effective competition, especially in the "market for the supply of wholesale network infrastructure access (physical) at a fixed location" - Market 4 and the "market for supply of wholesale broadband access" - Market 5, especially in certain geographical areas, as demonstrated by the results of the analysis of these markets. This does not, of course, invalidate the relevance of the spin-off of ZON, which was the subject of the position of ICP-ANACOM on 3 April 2008⁷⁷, which contributed to the adoption of a geographic segmentation in Market 5, with the definition of a competitive area not subject to ex-ante regulation.

In this regard it is important to note that the cable network is not subject to access obligations, even while in 2005 Grupo PT was declared as having SMP in the wholesale and retail access markets, whereby obligations were only imposed on one company of the Group, PTC. This analysis of the relevant broadband access wholesale markets (markets 4 and 5), entered into consultation following the spin-off of ZON, and the analysis of the

⁷⁵ Particularly in view of the high costs of constructing new passive infrastructure.

⁷⁶ See in this respect Chapter 2 of the consultation document.

⁷⁷ See: www.anacom.pt/render.jsp?contentId=569973.

market for broadcasting services (Market 18) in August 2007 considered the providers of services based on coaxial cable networks as not holding SMP in these markets, whereby they will not be subject to the imposition of *ex-ante* obligations during the reference period of the current market analyses. Moreover, in comments on the analysis of markets 4 and 5, the European Commission itself strongly called on ICP-ANACOM to exclude accesses to the cable market from the definition of Market 4⁷⁸. The services provided over the cable networks, including the fixed telephone service and broadband Internet access, are, however, subject to specific regulation with respect to these services (including authorisation, access to emergency services, numbering, quality of service, etc.).

It is also noted that the analysis of markets 4 and 5 reflects the current competitive situation, which continues to see a preponderance of the copper network (PT) and to a lesser extent, of the cable network (in particular of ZON), but envisages evolution towards NGA, commencing in the short term.

ICP-ANACOM also recognises that the development of new solutions for wireless access systems, especially BWA systems, can contribute to the promotion of competition and, principally, complement the coverage of new networks, particularly in areas of lower population density. An auction of suitable spectrum is currently in its final stages^{79,80}. In any case, in view of the physical limitations which are known to be associated with the use of the radio spectrum to provide services with high-bandwidth (transmission capacity), it may be questionable whether over the long term, and especially with the development of FTTH architecture, the wireless access networks, both BWA and 3G (or 4G) mobile networks, will be able to compete directly with networks supported fully in fibre optics when it comes to the provision of very high speed services, exceeding 100 Mbps for dedicated access (for example, in the provision of 1 Gbps unshared access)⁸¹. Such competition may, however, only apply for consumers who do not need such high levels of bandwidth.

This Authority has also recognized the need to take into account the investments already made by alternative operators in the fixed network, especially in terms of co-installation in exchanges, an issue which will be examined in a later section. But now it is reaffirmed that PT should be able to "*shape and design [its] future access network as it sees fit and at its own pace*.", i.e., it should be able to develop the access network in accordance with its

⁷⁸ See: http://www.anacom.pt/streaming/EC_comments_pt_2008_0850.pdf?contentId=812399&field=ATTACHED_FILE.

⁷⁹ See in this regard the consultation process concerning the rights to use frequencies reserved for BWA, decision of 24 January 2008, and the limited consultation process for implementation of a spectrum auction system, respectively at: <http://www.anacom.pt/render.jsp?categoryId=267122&themeMenu=1#horizontalMenuArea> and <http://www.anacom.pt/render.jsp?categoryId=268027&themeMenu=1#horizontalMenuArea>.

⁸⁰ It should be noted that to date it has not been shown that BWA systems are an alternative to broadband access in Europe, although BWA has had an impact in Ireland, Estonia, Hungary and Slovakia.

⁸¹ However, wireless access networks may come to complement FTTx based offers, with the possibility of mobility, allowing services which are *always-on*".

needs and efficient investment plans. However, this freedom must be linked to principles of transparency and non-discrimination, to ensure regulatory predictability - a principle which PT itself advocates in order that it too is able to invest in NGA - so that the recent investments which operators have made in LLU, when efficient, are not harmed (and should be recouped as far as possible) and that the capacity derived with such investments to generate competition should not be compromised.

At the same time, ICP-ANACOM also recognises that all entities will need to make an additional effort to streamline processes and procedures for "switching operator", both for end-users and for the operators themselves⁸², especially in the initial phase of evolution to NGA, during which it is more important to reduce or eliminate any barriers to this evolution.

Important issues are raised, such as access to buildings for the installation of infrastructure, the use (on equal terms) of the "essential network resources which PTC possesses"⁸³ (including conduits), as well as the lack of comprehensive information on existing infrastructure, which will be addressed in later sections.

It is also noted in this context that following the publication of the Resolution establishing the strategic guidelines of the Government for the development and promotion of investment in next generation networks, ICP-ANACOM was made responsible for proposing and proposed, according to the defined timetable, "concrete measures, legislative or otherwise, to be adopted to ensure that all operators have open and efficient access to the network of conduits and other relevant facilities belonging to all entities with this type of underground infrastructure, for the installation of next generation networks".

There are measures which market participants support and which it is recognised can make a real contribution to faster and more efficient investment in NGA, but which fall outside the scope of ICP-ANACOM's remit. However, the Authority does not exclude itself, nor is it excluded, in its role of advisor to the Government, from proposing solutions which might better promote the development of NGA, competition and social well-being.

Regarding the evolution of other access networks to NGA, the majority of responses point to the possibility of an evolution with different starting points, i.e., the possibility of existing copper and coaxial cable networks evolving into fibre optic networks over the long term, whereas some entities believe that core next generation networks already exist. In fact, the existing core networks supporting new triple-play services (and also the recent developments in core mobile networks) are characterized primarily by being integrated multi-service networks and by being "all-IP", supported in turn by fibre optic networks, whereby these may be, to some extent, considered as being included in a broad concept of NGN.

⁸² Change (in terms of support of the service) between wholesale offers or switching of (support of) leased offer to own network.

⁸³ As stated by SONAECOM.

With respect to the evolution of the cable access network, there appears to be some differences between the position taken by ZON, the largest cable operator, and the positions of the remaining entities. While ZON states that this evolution "*cannot lead to NGA based on fibre optic*"⁸⁴, due to constraints arising from the sharing of spectrum/bandwidth, it is precisely these limitations of cable networks which, according to other entities, will drive the evolution of these networks to NGA supported fully by fibre optics, in order to keep up with the demand for greater bandwidth by the end-users, possibly exceeding 100 Mbps.

Indeed, even technological developments foreseen for the cable networks (including the DOCS 3.0 standard) cannot stop these networks from possibly reaching their limits in terms of capacity in the near future, whereas the reduced division of cells by group of users, which also requires a high level of investment, can only be enacted up to a certain threshold, with the risk that it will not be possible to generate a positive return (with a very small number of customers per cell). It should be recalled that the capacity of a given cell is always shared by the users connected to it⁸⁵.

The networks fully supported by fibre optics do not suffer these limitations - their capacity is virtually unlimited (even if shared) - and appear, also according to the general view, to be the technological solution which over the long term provides support to services which require massive use of bandwidth (and long distances).

It is noted that the current cable network (HFC) has an architecture which is similar to an FTTCab network (in that it already has a core fibre optic network up to points similar to street cabinets), which is encompassed by NGA solutions, as the short / medium term solution and the transition to FTTH solutions in the longer term.

2.2.3 The traditional access network

Question 6: Do you consider that there is currently sufficient level of coverage, not only in geographical terms but also in terms of diversity, of retail offerings supported by LLU? Are there, in your view, any constraints on its expansion?

PT begins by commenting that it understood neither the scope of this question nor its purpose, considering that it relates to different realities, with different regulatory approaches, whereas the debate should focus on investment in NGA and not on issues related to

⁸⁴ However, note is made in this respect of the interview given by ZON's Chairman on 20 August 2008, in which it is stated that "[the] *modernization of the network is another front that ZON is not neglecting, in order to be prepared for the emergence of fibre optic Next Generation Networks. Rodrigo Costa does not appear concerned because certain homes in certain areas are being cabled with fibre optic*".

⁸⁵ Since coaxial cable is a resource whose use is shared, i.e., one cable (e.g., entry to a building) is shared by multiple accesses/users, in similarity to wireless access networks. Meanwhile each copper pair is dedicated to the access of each user (the loop itself is not shared by several users).

wholesale solutions for copper access and to the historic network (including "*concern about the investments and the financial health of the various operators*").

PT considers that there is a sufficient level of coverage in geographical terms, in terms of the RUO, available throughout the national territory, making it possible for the full range of supported retail offers (allowing diversity of offerings) to be developed by alternative operators with complete autonomy, with national coverage and without any geographical constraint. However, PT acknowledges that this offer has only been used by the alternative operators in areas with levels of purchasing power and population density which is higher than the national average, while also taking part (but to a lesser extent and in other areas) in the different offers of PTC, such as the RAPT or the RCAO.

CEGEA believes that the current geographic coverage of the retail offers supported by the LLU is appropriate and that an increase in coverage would imply co-installation in a "*disproportionate number of MDFs*", and as such, it does not appear economically viable to offer retail products based on LLU throughout the national territory. CEGEA also mentions that the wholesale offers of the *bitstream* type will be more pressing in the context of NGA, which, from an economic point of view, would enable greater coverage of the offers of competitors at retail level.

COLT expressed the view that the current retail offers appear manifestly inadequate, perhaps as a result of the alleged lack of transparency, currency and accuracy of information provided with respect to records on the network, a shortcoming which it proposes should be corrected.

In light of the level of investment required, ONI does not consider it likely that the coverage achieved by the alternative operators that use the RUO will expand significantly. Furthermore, ONI comments that the technical limitations currently imposed by ADSL2+ technology means that the resulting offers will not, in all likelihood, differ significantly from those currently available.

ZON states that it does not have enough information to respond this question.

SONAECOM takes the position that the RUO does not provide the conditions necessary for coverage of the entire national territory because there are restrictions in the offer⁸⁶.

With respect to available information on the access network, SONAECOM argues that the existence of reliable information - currently unavailable - on the number of available loops at a given exchange and on the type of services that may be offered through the same exchange⁸⁷ is essential so that operators are able to evaluate the risk of investment⁸⁸.

⁸⁶ Particularly in relation to: (i) lack of information on the access network; (ii) processes associated with the unbundling of the loop; (iii) low levels of provided quality of service; (iii) non-compliance and shortcomings in rules governing access to the exchanges, and (iv) remote enabling of exchanges.

⁸⁷ Single, double and triple-play penetration.

⁸⁸ SONAECOM also comments that one of the problems associated with expanding the geographic coverage of offers stems from difficulties in recovering the investment needed to unbundle loops at each exchange.

SONAECOM also comments that in the current situation, the little information made available by PTC is restricted to the number of loops installed per exchange and, even in these cases, is not reliable, whereby it is not possible to consider that conditions are in place which would allow this offer to be used for the most part of the national territory. SONAECOM therefore argues that it is necessary to make changes to the RUO with respect to these issues.

With respect to the processes associated with the unbundling of loops, SONAECOM take the view that the RUO has shortcomings which jeopardise the customer experience in the use of services and consequently, compromise their development, in the following regard:

- Non-active loops: SONAECOM argues that it is essential that these loops are unbundled in such a way as to minimize disruption to customers, proposing that the process be amended so that the technicians of both operators can be called out at the same time. The company also comments that the loop is unbundled at the exchange subsequent to customer intervention, which means that when PT technicians are with the customers, they cannot carry out a full test of the loop.
- Active loops: SONAECOM identifies two alleged failures: (i) firstly, the unbundling process exceeds the time offered by PTC at retail level⁸⁹, arguing for a reduction in the allowed period to 3 working days, (ii) at the same time, it supports the creation of mechanisms to correct situations where there are unbundled loops with no porting, or vice versa⁹⁰.

As far as levels of service are concerned, SONAECOM argues that with the launch of IP-TV offers⁹¹ and with the roll out of Ethernet solutions for the business market, the RUO needs to provide greater robustness with regard to available levels of service, with SONAECOM taking the position that there is clear discrimination in the RUO with respect to the internal offer provided to the retail services of Grupo PT⁹². In the business segment, according to SONAECOM, the situation is worse in that PTC provides leased circuits that are supported by xDSL and where the repair time is 4 consecutive hours (80% of cases).

In this context, SONAECOM takes the view that the RUO's current levels of service are a clear barrier to the development of the offer throughout the entire national territory, since it hampers the launch of bundled offers, which offers are essential to achieve the return on

⁸⁹ Stating that the regulator could easily confirm this statement with PTC's customer service department.

⁹⁰ That in the past there was a risk of undermining the credibility of the commercial offers of the alternative operators.

⁹¹ SONAECOM states that it is inconceivable, for example, that a television service only guarantees the repair of a malfunction with 10 working hours (meaning that the repair of a malfunction occurring on a Friday night is only guaranteed on the following Tuesday).

⁹² As an example, SONAECOM reports that, after contact with the technical support service of "meo", PTC stated that the repair target is 48 hours, although this may increase when there is a backlog of requests. According to SONAECOM, this 48 consecutive hours results unequivocally in clear discrimination in the RUO: operators whose services are supported by the RUO are only able to guarantee repairs according to a deadline based on working hours, while PTC guarantees repairs according to a deadline based on consecutive hours.

investments that have to be made in PTC's exchanges. According to SONAECOM, discriminatory treatment at the access level constitutes a barrier to entry and to the development of alternative competing offers in conditions of competitive parity.

Regarding the rules governing access to the exchanges, SONAECOM takes the view that there are artificial barriers to the use of own resources in these services and that these barriers should be eliminated⁹³, as a way of reducing the costs associated with entry into an exchange and in order to enable appropriate management of equipment. In the particular case of rules governing access to the exchange by technical staff, SONAECOM considers that it is essential to provide guarantees that malfunctions in co-installed equipment are repaired within a maximum of 2.5 hours in order to ensure repair deadlines which are consistent with the practices of PTC, especially in the leased circuits market.

Finally, with respect to the remote enabling of exchanges, SONAECOM believes that the current process of setting up APs by PTC in no way benefits the expansion of the geographic coverage of the retail offers supported by the RUO. For SONAECOM, this development is inevitable and, despite problems faced by alternative operators, it is part of a process of development and innovation that must be followed. However, the company considers it necessary to impose conditions with respect to this process, in order to minimize the distortive effects on competition and to ensure regulatory certainty in the market. In particular, SONAECOM considers that it is essential for the regulator to guarantee:

- The transparency of the process, ensuring predictability and information provided to beneficiaries⁹⁴. SONAECOM believes that, in regulatory terms, the points of PTC's network should be qualified only as either points with access or point without access and that there should be specific information about each of these points (location, number of associated loops, related geographical numbering, characteristics of the copper pair and conditions of co-installation)⁹⁵.
- The definition of the minimum conditions which this process of remote enabling should meet in terms of the number of loops associated with each new AP, conditions of co-installation, registry of loops and space available in conduits for the installation of fibre optics by alternative operators up to the point of unbundling.

Accordingly, SONAECOM considers that it is undeniable that the RUO has not been exploited to its full potential, while the advent of NGA, because of its intrinsic period of construction, cannot serve as an argument for neglecting this offer, which is essential for the

⁹³ In particular SONAECOM argues that the passage of the fibre optic of the beneficiary should be allowed in order to connect co-installed equipment to the beneficiary's network as should the installation of the co-installed operators' own internal cables.

⁹⁴ In this respect the company points to the paradigmatic case of the proliferation of new names given to points of PTC's network, whose definition is unclear (e.g. PA vs. remote unit vs. street cabinet vs. exchange).

⁹⁵ In this respect, SONAECOM takes the position that while the RUO already provides for the unbundling of the local loop, such access is currently impossible, due primarily to lack of information.

sustainability of investments already made and the justification of investments to be made in the future.

VODAFONE comments that only a proportion of national users will have access to more than one offer of fixed broadband services from alternative operators, either due to economic factors that make the co-installation of alternative operators in a larger number of exchanges prohibitive (small size and geographic dispersion of the exchanges make co-installation in more exchanges economically unviable) or due to the existence of restrictions⁹⁶ (of space and power) with respect to such co-installation.

Additionally, VODAFONE notes that PTC has been pursuing a policy of remote enabling the loops connected to the exchanges in which the RUO beneficiaries are already co-installed without providing any clarification on its programme for developing the network over the medium/long term. In this respect, VODAFONE says that it is not aware of PTC's criteria for selecting the areas covered, of the measures being taken to ensure the continued availability of the unbundling of the loops involved or of how the operators can participate in this process, thereby ensuring a predictable investment framework. VODAFONE further affirms that little information is made available to beneficiaries on the total volume of loops which are remote enabled, or on the percentage of these loops which in fact remain unavailable at the national level.

From its experience, VODAFONE notes that there are APs which may allow co-installation since their access points are located in buildings (with more space), while others are in the street cabinets, without conditions which allow co-installation. Since the information provided under the RUO makes no reference to these type of situations, VODAFONE believes that this will result in asymmetry with respect to the information of alternative operators compared to that of PTC, with negative implications in the analysis of the business plan of retail offers based on LLU, particularly in terms of the potential level of coverage and the implementation of alternative operator networks.

Question 7: How do you view the current wholesale reference offers, in terms of promoting effective competition and the development of networks and their coverage?

PT reiterated that the discussion about the wholesale offers of PTC is not the key part of the debate on NGA, and that these offers are associated with the concept of the investment ladder (so that operators gain critical mass by investing in alternative infrastructure). Indeed, PT argues that it is in a phase of investment in new infrastructure and not a simple evolution of copper to fibre (and, as detailed in responses to earlier questions, the cable operators would take the same path, without having climbed the investment ladder, since they invested in their own infrastructure from the outset). According to PT, there should be discussion of a

⁹⁶ VODAFONE adds that operators interested in co-installation are, in various exchanges, faced with constraints, which to overcome, would imply costs which would run into the hundreds of thousands of euros, making existing business plans (and/or future plans) unviable.

regulatory strategy for NGA and not continued insistence on addressing the wholesale offers of PTC.

For PT, there are two determining factors with respect to competition at an infrastructure level:

- Local loop unbundling - in mid-2008, 36.5% of ADSL accesses were supported by LLU, demonstrating the importance of the RUO in sustaining competition at the level of the local networks and access to the end-customer.
- The spin-off of ZON - access via cable modem made up (as of the same date) 40.4% of the broadband market.

Therefore PT is of the position that it is not dominant in broadband access networks at a national level noting that, in many areas, it is the cable operator that is dominant.

According to PT, the current reference offers of PTC (RCAO, RUO, RAPT, ORCA, ORLA, ORI and PRAI) as well as "Rede *Ethernet* PT", cover the entire value chain inherent in the support of fixed retail offers of voice, data and Internet and will be a factor with relevance to the existence of alternative (access) networks, in particular the RUO (to the detriment of the RAPT offer) and the RCAO (which ensures conditions for the installation of fibre optics in the local network, with Portugal being ahead of other countries in this respect), since they will ensure that operators enjoy a high degree of technological and commercial autonomy.

PT considers that its wholesale offers contribute, and have contributed, to the promotion of effective competition in the sector (including when compared with the situation in European countries) and have been made available at national level, incurring large scale financial effort (e.g. national coverage of the RAPT offer), but also considers that at the beginning of NGA, these offers will not be the only driver of investment. PT therefore considers that the issue of furnishing the country with new infrastructure should not focus on a "blind" adaptation of the RUO and RAPT offer to NGA⁹⁷ or insist on virtual solutions, given that NGA fibre optic architecture, in line with the cable networks (HFC), does not include unbundling of the optical loop, whereby PT argues that operators should instead invest in their own solutions.

PT concludes that the RUO does not provide for new fibre optic solutions, while the RAPT should not be extended to virtual solutions, when the RCAO exists. PT also refers to the position of CMT⁹⁸ which it considers, in this respect, an example which should be followed, because:

- It does not oblige the unbundling of fibre optic, or the opening up of FTTH architectures.

⁹⁷ In this respect PT refers to the response it gave to question 4.

⁹⁸ The Spanish Regulatory Authority

- It only requires the provision of virtual unbundling, where there is no access to conduits, and even then, only for those operators which are firmly committed to the use of conduits and to fibre optic investment.

FCCN considers that the current wholesale market comprises a certain inertia to technical and product innovation.

According to COLT, the current wholesale offers do not generate effective competition, given the current levels of service (misaligned with reality), the onerous nature of the implemented processes (involving an increased delay in the activation of the service to consumers) and the difficulties in accessing the network itself.

According to the position taken by ONI, the current wholesale offers, including the RUO and RCAO, will be key to the development of networks and their coverage and, consequently, to the promotion of effective competition. However, ONI believes that there are operational difficulties which result, for example, in delays in supply and excessive delays in the resolution of malfunctions, with consequent impact on the quality of service provided to end-customers and a poor image for the alternative operators. Nevertheless, ONI recognises that it has been possible for alternative operators to bring competitive offers to the market.

According to ZON, the current wholesale reference offers have played a very important role in promoting effective competition in the broadband markets, allowing to a certain extent, and notwithstanding the improvements which could be made to these offers, profitable business models for alternative operators. ZON considers that the current wholesale offers, by ensuring a return to PTC (even when the service is provided by an alternative operator), guarantee the resources necessary for the development of the network on which they are based, with appropriate levels of coverage, but do not favour the development of alternative networks.

Furthermore, ZON takes the position that there are clear limitations to increased coverage of the offers of alternative operators beyond a certain threshold, which is confirmed by data provided by ICP-ANACOM in Figures 4 and 5 of the document which gave rise to the present public consultation. However, according to ZON, it is important to note that the current wholesale offers counteract the effects of a lack of effective competition in a market with a copper based network architecture and, as such, must be reconsidered and amended (but not necessarily eliminated), at a more advanced stage of the market, once NGA is implemented and insofar as SMP continues to be identified in the relevant markets.

Finally, ZON emphasises the need for an immediate review of the RCAO to ensure compliance with the principles of non-discrimination and transparency in particular in relation to:

- reducing intervention periods;
- inclusion of information on available conduit space;

- submission to viability requests; and
- difference in treatment between PTC and other operators, which, in addition to facilitating access by PTC, also means that PTC has advance knowledge of the expansion plans of its competitors, while the competitors have no knowledge of PTC's plans.

As part of this review, ZON takes the view that it is important to carry out a comprehensive analysis of and implement the structural separation of the wholesale business of PTC, giving consideration to the creation of a company which is legally independent from PTC and which will take possession of the infrastructure of conduits, poles and other facilities and locations, as well as other assets which today are subject to regulated offers, such as submarine cables⁹⁹.

According to the view taken by SONAECOM, subsequent to its response to the previous question, the RUO suffers from serious shortcomings which prevent alternative operators from competing on an equal footing with PT in the fixed network market. These shortcomings are, according to the view taken by this operator, even more serious when it is considered that this offer will support the services that will be instrumental to the development of the fixed network over the next decade, i.e., *multi-play services*. The discriminatory aspects and those limiting the growth of the offers of the beneficiaries of the RUO restrict, according to SONAECOM, the degree to which this offer adequately answers the demands of the market and, at the same time, negatively impact the development of competition at a crucial moment in which the operators are preparing - or, as in SONAECOM's case, have already begun - significant investments in NGA.

With respect to the RAPT offer, SONAECOM considers that this offer plays an important role in the launch of offers for an operator which is entering the market by making it possible to achieve the critical mass necessary to support larger scale investments and so climb the investment ladder. However, it considers that its role should be reassessed with respect to NGA, insofar as, given the characteristics of these networks and the obstacles to parallel development of various networks, there are grounds for demanding more at a technical level.

In this respect, SONAECOM refers to the lack of flexibility in setting up offers with characteristics that are distinct from those launched by the entity managing the infrastructure¹⁰⁰, as well as the absence of a tariff which allows the underlying economies of scale to be shared or the possibility of interconnection at lower levels of the network. According to SONAECOM, these problems have held back the wider use of this offer by the alternative operators and their elimination in this new paradigm should be examined.

⁹⁹ In its response to question 25 of the public consultation, ZON develops this proposal in greater detail.

¹⁰⁰ Including levels of service differentiated by traffic type.

In this context, SONAECOM considers that the existing reference offers are characterised by the fact that they lead to a huge asymmetry of information between PTC and the other operators (their competitors), which should be corrected by the regulator. According to SONAECOM, PTC:

- Is supplied with sensitive information on operational and commercial aspects of the business plans of its competitors¹⁰¹.
- Does not provide essential information which the alternative operators need to plan and develop their networks¹⁰².

SONAECOM notes the precautionary measures imposed recently by CMT on the incumbent operator in Spain in order to oblige it to provide the alternative operators with "*all necessary information about their civil engineering infrastructure so that the other operators can plan their requests for access*"¹⁰³. In the view of SONAECOM, it is important to impose obligations on PTC with respect to information (transparency) equivalent to those imposed by CMT, otherwise there is a risk of irreparable damage to the existence of effective competition in the market.

For Vodafone, the obligations arising from the implementation of the RUO, the RAPT offer and the RCAO in the current regulatory framework have not resulted in satisfactory results with respect to the development of the market for the provision of fixed broadband services, whereby such obligations are insufficient to ensure conditions which provide for the existence of a competitive market¹⁰⁴. VODAFONE's assessment results from the identification of important barriers to entry embodied in a range of different limitations, restrictions and constraints, impossibility of co-installation, excessive response times, identification of exchanges (e.g., whether or not, it is a Remote Unit - RU) and, in particular, processes involving the call out and/or intervention of PTC's technicians, whereby:

- RUO: VODAFONE identifies the following critical issues (i) how cases of constrained exchanges are managed (through the presentation of extended deadlines/high

¹⁰¹ Through the requirement to submit demand forecast plans, sometimes 18 months or 2 years in advance. SONAECOM submits that this practice allows PT to anticipate any strategic move by its competitors, both in terms of promotional campaigns or in terms of win-back specifically targeted at exchange areas included in the forecasts of the operators including, in the future through the installation of fibre optic directed at areas or buildings where their competitors intend to advance

¹⁰² According to SONAECOM, not only does PTC disclose virtually no information regarding the current process of remote enabling exchanges but PTC also provides no information on the occupancy rates of the infrastructure (conduits, etc.), which information is necessary for the installation of NGA by the other operators.

¹⁰³ Specifically, SONAECOM comments that CMT has obliged Telefónica to share information on (i) the relationship of FTTH / GPON exchanges which it plans to build up to 2010, the area of coverage and planned date of operation; (ii) their engineering infrastructure, including the space available in the conduits and chambers in the areas where it is intended to install FTTH in the next 14 months; and (iii) with respect to installation planned beyond the next 14 months sufficient information should be given, 1 year in advance of starting development, on the infrastructure involved and available space.

¹⁰⁴ VODAFONE states that this conviction is backed up by data from OECD and ECTA on the rate of penetration and its growth.

prices, not supported by detailed information), (ii) the lack of transparency in information provided to the market as referenced in its response to question 6, (iii) the excessive price charged for each test loop (necessary to assess the feasibility of supporting additional services such as IP-TV) and (iv) PTC citing "lack of customers" as a reason for not proceeding with the installation of inactive loops despite confirmation of their presence¹⁰⁵.

- RAPT: VODAFONE takes an extremely critical view of the RAPT offer because it considers that it does not allow a minimum return to be achieved which allows alternative operators, mainly for reasons of scale and geographical presence, to compete with PT's retail offers¹⁰⁶.
- RCAO: Despite the innovative nature of the RCAO and the undeniable interest in the offer, Vodafone considers that the procedures of the RCAO are too protracted and bureaucratic, resulting in delays and/or difficulties in the installation of cables by alternative operators.

For these reasons, VODAFONE considers that it has been shown that current wholesale reference offers continue to be too susceptible to practices which allow PTC to flee evade the obligations contained therein.

Position of ICP-ANACOM

ICP-ANACOM recognises that the means of access to the local loop provided for in the RUO includes, from the outset, all the MDFs of PTC's network¹⁰⁷, covering the entire national territory and that naturally the operators have chosen to initiate their offers in areas of highest population density - corresponding to the larger MDFs - and greater purchasing power per capita.

Meanwhile, even though the number of MDFs where the beneficiary operators of the RUO are co-installed has been steadily increasing and their offers are already available to 60% of the population at retail, it is a fact that recently the number of MDFs where alternative operators provide services has been stagnating. Additionally, the main user of the RUO, SONAECONOM has not sought, until recently, to make intensive use of the wholesale bitstream offer of PT¹⁰⁸, since its triple-play offer is only available in parts of the areas covered by the

¹⁰⁵ By a team from VODAFONE. The operator adds that the system of penalties applicable to PTC and compensation for the beneficiaries of RUO is not a sufficient deterrent to infringement.

¹⁰⁶ As an example VODAFONE cites the recent provision of Ethernet unbundling (significantly cheaper than previous IP and ATM options), which features a coverage of service which in most areas overlaps the areas where alternative operators are present with LLU offers and where they have offers based on their own networks, whereby there is no additional appeal for operators. As such, VODAFONE concludes that this technical solution only allows rational use with economic benefits by the business units of PT itself.

¹⁰⁷ Access to sub-loops may occur using other types of equipment on PT's network (e.g. street cabinets).

¹⁰⁸ Even though it has recently acquired the accesses of Tele2 and the residential accesses ONI based on that offer.

exchanges where it has co-installed equipment, whereby it competes (only in these parts) with offers that are similar to those of PT and ZON.

It would naturally be desirable for alternative retail offers, in particular triple-play, to be uniformly available across the national territory, which presupposes, among others things, the continued expansion of LLU into regions that are less developed or more remote.

However, as indicated by more than one entity, especially the beneficiaries of RUO, co-installation in more MDFs is not likely to be economically viable, due to their greater geographical dispersion and smaller size, while at the same time technical constraints exist¹⁰⁹ with respect to access to other MDFs. In the consultation document, ICP-ANACOM recognised that a relatively small increase in coverage would imply co-installation in a large number of MDFs, requiring significant investment along with an expected reduction in the average number of unbundled lines per MDF (new MDFs will have a lower installed capacity) and, as a consequence, *ceteris paribus*, a reduction in revenue per MDF.

Regardless of the economic issues, which need to be examined on a case by case basis and with all the detail provided by alternative operators, ICP-ANACOM gives utmost attention to the concerns of the various entities in regard to what they consider an evident lack of symmetry, transparency, currency and accuracy of the information made available by PTC on (the records of) the access network, as well as the process of "remote enabling of exchanges" and relocation of loops and on the plans for the development of the network, which issues are addressed in section 2.2.5 of the present report.

It is ICP-ANACOM's expectation that, with the resolution in the short-term of the constraints which still affect the RUO and RCAO (and even the RAPT), especially in terms of greater transparency and better alignment with the principle of non-discrimination, the conditions will be in place which will make it possible for operators which support their offer using LLU to expand coverage of their networks and thereby ensure conditions for a more intensive competitive environment. While taking into account that the main purpose of this consultation is to address the regulatory approach to NGA, the market failures which (continue) to characterise the access market in Portugal and the measures needed to mitigate such failures must be addressed.

As such, while the main purpose of the public consultation and the analysis of ICP-ANACOM is to seek the establishment of the regulatory framework for NGA, it is also important to ensure transparency and promote regulatory predictability, as well as continuity in the LLU based model (as long as there is dominance in the respective market). If these principles are not ensured, the operators could view their past expectations as being dashed and so hamper the development of a market where these participants need greater transparency and predictability so that they can make informed, timely and long-term investment decisions.

¹⁰⁹ Including constraints of space and power to connect to the remote exchange.

It is noted in this respect that the operators and beneficiaries of the RCAO and of the RUO have made investments in infrastructure and their own networks, with the expectation of an appropriate return from the retail services based, in part, on these wholesale offers.

In this context, and recognising, as for example is also recognised by PT or SONAECOM, that changes in the access network are inevitable and are part of a process of progress and innovation, the position is taken that this process should not have a negative impact on the levels of competition already achieved and the resulting benefits for consumers. In this context, it is necessary to define mechanisms which provide for a non-disruptive migration to NGA. In this way, even while NGA is the central subject of the consultation document, the current wholesale offers (including the RCAO, the RUO and, in certain areas, the RAPT offer) it remains necessary to ensure and, if possible, enhance over the medium term, the competitive levels which have already been achieved, whereby it is essential to monitor and adapt them to the requirements and developments of the market. It is noted that PT itself recognises the importance which its wholesale offers have had in promoting competition in the markets (offers which naturally will remain in place while PT has SMP in the wholesale access markets).

ICP-ANACOM does not intend to "blindly" adapt the current wholesale offer to NGA, in part because at this stage it is unclear which technical-economic models will result from developments in the medium term, but rather intends to adapt these offers to the needs of the market, and essentially, to seek, in a timely manner, to anticipate the potential impact that the evolution to NGA will have on these offers, from a perspective of regulatory predictability.

ICP-ANACOM also takes the view that the investments made by alternative operators in their own solutions, if and when technically and economically feasible, and where necessary using the wholesale products, fosters sustainable competition in the long term at the infrastructure level. To achieve this objective it is necessary to ensure conditions for equivalent access to relevant passive infrastructure (e.g. conduits) which have significant bearing, as recognized by the operators, on the development of the access network itself. That is, it is necessary to maintain the possibility of ensuring access to infrastructure which is not easily replicable, seeking to establish and/or maintain a "level playing field" so that all operators are able to develop better and distinct solutions for their customers, under identical and non-discriminatory conditions.

ICP-ANACOM has, moreover, recognized that the RCAO can contribute to the development of competition by facilitating the installation of alternative infrastructure. It is necessary, however, to take into account that this wholesale offer takes on fundamental importance in the context of NGA, whereby significant improvements must be made with respect to its efficiency.

Therefore, the majority of responses received from the alternative operators pointed to the need for a review of the various wholesale offers with the aim of enabling greater technical

and product innovation, through: (i) the provision of more demanding levels of service, (ii) the definition of simpler and swifter procedures, (iii) the guarantee of greater transparency and symmetry in the provision of information, (iv) the definition of tariffs which allow sharing of economies of scale, (v) the reduction of constraints on co-installation and (vi) the expansion of coverage (e.g., Ethernet unbundling).

ICP-ANACOM has sought, and will seek, to act to reduce, as far as possible, restrictions on the development of solutions based on the wholesale offers of PT while taking into account the specifications and complexities of each wholesale service, the need to maintain consistency in pricing and levels of service, and also to ensure the necessary return on investments which PT makes so that these wholesale offers are available to the beneficiary operators.

As stated above, ICP-ANACOM will soon conduct an analysis of the main concerns raised by operators in relation to the reference offers.

2.2.4 Access network developments

Question 8: What is your view of how demand for retail services (new services or similar services with higher bandwidth) will evolve? Please identify any relevant factors, in terms of increased bandwidth, which limit the ability to provide these services to end-consumers?

According to PT, demand will be severely constrained by the availability of services and not the other way around. However, PT acknowledges consumer interest in increasingly high speeds (at least 40-50 Mbps), which will only be satisfied through fibre optic solutions, while in practice the copper networks (but not the cable networks) have reached the limit of their development capacity.

Due to the high level of investment involved, PT believes that NGA cannot be implemented simultaneously throughout the national territory, and that its geographically progressive development, in accordance with the demand for broadband services, is an aspect which is underlined in the scenario of fibre optic to the customer's home (FTTH). As such, PT considers that the regulatory framework has a key role in this context.

According to ERICSSON, the general trend is that the services offered will lead to an increase in the bandwidth used in access to end-users.

COLT comments that retail services are evolving into increasingly specific services with increasing needs in terms of bandwidth. In the opinion of COLT, this means that if access is not made available to all operators, consumers will not be able to select the service which

best suits their requirements (or even be completely denied access to this service) and will only be able to access services which are available in their particular geographical area.

ONI takes the position that the answer to this question is heavily dependent on the model which will be adopted for the development of NGA.

ZON refers to the increasing trend of the market in terms of demand and provision of retail services which require greater bandwidth. At the moment, according to this company, the provision of such services does not appear to be limited, given that the current cable network is scalable. However, in future, such limitations may emerge, and it is therefore important to the market and to the country to define an appropriate regulatory framework in order to ensure the success of the NGA.

Regarding the expected evolution of demand for retail services and the implication for bandwidth needs, SONAECOM refers to the response which it gave to the first two questions of the public consultation. According to SONAECOM, it is in this respect that the justification for NGA lies, insofar as optic fibre is the transmission medium which allows a greater degree of scalability in terms of available bandwidth.

According to VODAFONE, in certain situations, the existing network structure and currently available bandwidth already limits the provision of some services (in the case, for example, of IP-TV and VoD services)¹¹⁰. VODAFONE says that such situations have tended to become widespread, so it will only be possible to meet the growing service needs of customers by upgrading the technology of the access network, in particular to NGA. According to VODAFONE, when migration is conducted, it is necessary to ensure proper supervision of unfair competitive practices, in view of the fact that NGA will further facilitate the bundled provision of different or convergent services, in particular by the holder of the infrastructure, which competitors will find hard to replicate.

Question 9: What kind of technical solutions (e.g. point-to-point or point-to-multipoint) and what type of developments in terms of extending the network to fibre optic (FTTx) do you envisage as having most viability in function of the evolution of retail offers, the density and location of the area served, and the topology of the existing network?

According to PT, three architectures should be looked at in the context of NGA: FTTCab, FTTH/B and HFC, whereas only HFC and FTTH architectures are comparable in terms of broadband potential, allowing speeds to the order of 100 Mbps and 1 Gbps respectively¹¹¹. As an intermediate step in this evolution, PT identifies two types of technical solutions: those

¹¹⁰ Which, according to VODAFONE, require that the providers of these services strictly manage bandwidth available in the access channel, limiting and at times having a negative impact on the bandwidth available for other services in order to ensure the IP-TV service.

¹¹¹ According to PT, FTTCab architecture allows speeds of between 25 and 50 Mbps, which does not make it possible to satisfy the needs for bandwidth which, according to its response to question 1, PT sees as reaching 100 Mbps at the end of 2010.

for the copper networks, with large scale investments, and those for cable networks, with the advantage in terms of speed (100 Mbps using the DOCSIS 3.0 standard) and because the vertical barriers (access to housing) affect them much less than the operators using copper access.

The FTTH/B solution is the only solution which, according to PT, is future proof, providing virtually unlimited speed to customers (upwards of 100 Mbps). PT takes the view, however, that it is not very plausible that a single solution will be adopted for all cases, and that rather the solution which will be implemented in a particular area will depend on the needs of business/service. With respect to topology, PT considers that FTTH/B architecture can be built according to two alternatives, point-to-point or point-to-multipoint (PON), the latter option benefiting from extensive economic benefits in terms of investment and operating costs¹¹², being a passive solution with sharing of the optic resource¹¹³. Due to their limitations, especially in terms of investment costs, PT believes that point-to-point solutions may only be adopted in very specific cases.

PT also comments that at present the most commonly used platform in the development of FTTH/B is GPON. As a successor of xDSL technology, GPON will allow the mass roll-out of these architectures and will be adopted by the major European operators, including PT, which is examining an initial approach with GPON technology, standardized by ETSI, in the event that regulatory, competitive and commercial conditions and levels of technological maturity allow its sustained use. According to PT, the cable operators have also been examining the possibility of migrating their networks to FTTH technology, especially to GPON¹¹⁴.

According to ALCATEL-LUCENT, there are two approaches to the roll-out of fibre optic networks in Europe: (i) mixed solutions using copper and fibre optic (FTTCab)¹¹⁵ and (ii) solutions consisting entirely of fibre optic (FTTH). ALCATEL-LUCENT comments that there may be a third approach, FTTB, if the placement of fibre optics in buildings is prohibitive (especially in terms of costs and rights of way).

According to ERICSSON, it is only possible to recommend an access technology in the light of detailed data on the network topology, availability of conduits and installation costs. According to the manufacturer, these last costs are the main costs associated with NGA, while in general FTTCab solutions are more advantageous in terms of CAPEX, whereas FTTH solutions have advantages in terms of OPEX (easier to maintain and operate). Both

¹¹² These are, according to PT, compact solutions of low consumption.

¹¹³ This is, without the need for active equipment.

¹¹⁴ PT refers to the presentation of ZON available on the website of CMVM.

¹¹⁵ With fibre optics from the local optic exchange to the street cabinet and VDSL, allowing asymmetric speeds of up to 50 Mbps, with fibre to home developed during a 2nd phase (or immediately in new areas).

solutions can be point-to-point or point-to-multipoint and feasible, with ERICSSON identifying benefits in each^{116,117}.

FCCN comments that a strong tendency can be expected towards the initial adoption of point-to-multipoint solutions, since it considers that the operators have not made the quality of their networks a priority. FCCN also mentions that point-to-multipoint solutions can be adopted in areas of lower population density (providing a greater return over the short term) while in other areas there are grounds for the adoption of point-to-point solutions.

CEGEA indicates that the decision on the specific type of technical solution to be adopted should fall to the operators. According to CEGEA, this decision will depend, among other things, on the size of the market and the cost structure associated with the geographical area concerned. CEGEA, also indicates that the decision of the operators should incorporate any regulatory impositions of a non-technical nature, such as objectives of the public interest, including coverage, quality of service, etc. CEGEA considers that from a regulatory perspective a balance must be sought which ensures an appropriate relationship between incentives to invest in NGA and competitive benefits.

COLT views FTTH (point-to-point) as the best solution over the long term, allowing the continuation of competition at the infrastructure level (preserving the investment ladder principle), considering that its capacity for alteration and expansion can be adapted to a use based on each individual consumer. According to COLT, this solution also allows local loop unbundling to be maintained and the continued sharing of conduits, allowing significant reduction of costs in the installation of fibre optic, which will also benefit the end-consumer.

ONI takes the position that the answer to this question is also dependent on the model which will be adopted for the development of the NGA.

According to ZON, the alternatives of point-to-multipoint passive optical networks respond to most needs, whereby they should be an option under consideration, whereas the FTTH option will be of most interest in terms of compatibility with the evolution of retail offers. However, given the different costs and advantages underlying the various alternatives under consideration, ZON considers that it is the operators who must decide on the technology model which is most appropriate for meeting the needs of the market.

According to SONAECOM, the main cost component in the development of a fibre optic network is associated with civil engineering (in the horizontal and vertical network), whereby the costs of an FTTH network is determined by the costs of opening trenches and,

¹¹⁶ Advantages of PON: less consumption (with n users sharing a laser and processor in the exchange), less space (less exchange equipment) and simpler upgrades (with less disruption when increasing capacity, with new wavelengths).

¹¹⁷ Advantages of point-to-point networks: lower effective costs for sparse solutions and allows fibre optic unbundling (i.e., wholesale access to fibre optic).

secondarily, by the costs of acquiring and installing optic cables between the core network and the customer's home¹¹⁸.

According to SONAECOM, networks based on "active Ethernets " need more conduit space and consume more power, requiring greater cooling capacity. Insofar as the main cost of FTTH results from the costs associated with the basic infrastructure, SONAECOM takes the view that opting for a solution which minimizes infrastructure occupation is more appropriate in order to promote greater coverage of any network. However, despite the identified advantages, SONAECOM indicates that challenges remain with respect to xPON technology which need to be overcome¹¹⁹, including with respect to the form and complexity of implementation associated with the management of a shared resource¹²⁰.

Given the advantages and disadvantages and given the current expectations for the development of GPON over the short term, SONAECOM believes that this is the most appropriate architecture for the widespread development of fibre optic networks in Portugal.

According to VODAFONE the choice between point-to-point or point-to-multipoint solutions will be determined primarily by the need to respond to the different customer types with different bandwidth consumption profiles over the medium term and, consequently, the way in which the operators will have to ready themselves to meet this need for bandwidth and features.

According to VODAFONE, point-to-point topologies allow virtually unlimited bandwidth but require greater investments that are not easily affordable by any of the operators. Therefore, it considers that this kind of architecture only makes sense for the connection of customers with high average consumption (business segment) and customers who need greater bandwidth, with limited application to residential customers in densely populated urban areas. Furthermore, in line with other positions set out above, VODAFONE considers that GPON technology seems to have greater application and a better future, due to the harnessing of the fibre optics of primary cables and all ancillary equipment resulting in lower investment and yet providing very large bandwidth with high potential for future growth (multiplication by a factor of 4 within a period of less than 2 years).

¹¹⁸ According to SONAECOM, this situation limits the possibility of a substantial reduction in the price of developing FTTH in that labour costs remain stable over time, contrary to the costs of the associated electronics, which are in a downward trend.

¹¹⁹ According to SONAECOM, GPON currently supports 2.5 Gbps downstream and 1.25 Gbps upstream to be shared by up to 64 customers. Developments over the short term will raise this to 10 Gbps downstream and 2.5 Gbps upstream. The next step involves the use of WDM, with which it is possible to have a wavelength per customer, i.e., virtually infinite bandwidth per customer, thereby ensuring that the investment made in the choice of architecture is protected.

¹²⁰ However, SONAECOM comments that the experiences and pilots which it has conducted itself and which have been conducted by its European counterparts have reinforced initial positive expectations, since the potentially higher costs are mitigated by the scale and potential of ongoing investments. SONAECOM indicates that this technological solution is the option of around 25 reference operators around the world, and hopes that after 2011 technology will exist which enables the provision of a wavelength per customer, ensuring the solution's scalability).

In terms of unbundling potential, VODAFONE acknowledges that point-to-point solutions may allow a simpler process for the unbundling of local access fibre optics or the establishment of wholesale offers, although with significant impact in terms of infrastructure and space management. The operator also comments that GPON solutions do not prevent the implementation of wholesale offers for unbundling or sharing at the level of optic infrastructure (and not necessarily bitstream offers)¹²¹.

VODAFONE identifies FTTCab, FTTB and FTTH architectures as possible candidates for the implementation of NGA, noting however that FTTCab architectures are difficult to implement on the Portuguese network, especially in urban and semi-urban areas where the urban environmental concerns of local authorities have resulted in complex and lengthy licensing procedures and that PTC has claimed a lack of space in its infrastructure for accommodating the connections of other operators to the sub-loop.

VODAFONE considers that:

- in FTTCab architecture, bandwidth is limited to about 40 Mbps¹²² which over the short/medium term, may represent a limitation to the development of services;
- FTTB architectures have greater capacity to accommodate foreseeable expansion in bandwidth, allowing bandwidth to the order of 100 Mbps¹²³; and
- FTTH architectures have greater robustness and capacity for future evolution, with very large bandwidth and further room for growth.

Question 10: As a network operator and provider of advanced services, do you foresee that you will advance with the implementation of these solutions based on NGA? If so, which solution(s), on what time scale and with what geographic extension?

Although PT is studying different evolutionary paths to NGA, with preference for PON solutions (mass market), the operator states that it does not have any detailed plans with respect to the potential technology, timescale, scope and impact of the solution which it may adopt. In any case, it reports that it will only define a firm, consistent and coherent strategy, if the regulatory framework is altered and does not affect their investments, as with the investments of other operators.

¹²¹ Provided that clear and unambiguous rules of use are established between the alternative operators and PTC.

¹²² Taking into account the average distance, in Portugal, of connections between street cabinets and the end-customer.

¹²³ However, according to VODAFONE, these architectures have a clear disadvantage which results from the need for a local power supply which will be provided by the condominium. In the opinion of the operator, this means that the implementation of customer connections is highly dependent on having the agreement of other condominium owners, which is a barrier to the rapid implementation of the network and, furthermore, to the rapid process of provision which NGA should represent.

COLT reports that it is already developing the implementation of NGA solutions based on FTTH at a European level (although with some differences from country to country). In the specific case of Portugal, it mentions that coverage will be limited to areas where it currently operates (including Lisbon) while, in the near future, this limitation may, to some extent, be lifted.

ONI indicates that it is available to participate in the development of NGA at a national level. However, it mentions that the answer to this question is highly dependent on the model which will be adopted for the development of NGA.

ZON states this is an issue which it still has under analysis.

SONAECOM says the solution chosen for the development of NGA which is being implemented, is based on GPON, taking into account the need to ensure the least possible occupancy at conduit level, while at the same time maximizing the economies of scale that fibre optic allows. At the same time SONAECOM states that this solution will allow more efficient use of energy and less need for space in terms of racks¹²⁴.

With respect to the geographic coverage of NGA, SONAECOM notes that its expansion depends directly on the provision of information, not only on the records of existing and usable conduits in national territory, but also information on the historic network of PTC. According to SONAECOM, this information is important because knowledge of the copper network, on the one hand, leads to knowledge about the location of potential customers, and on the other- insofar as the RUO is a prior rung on the investment ladder to NGA - allows alternative operators to develop an intermediate step of creating a solid customer base, prior to embarking on the higher levels of investment associated with NGA.

However, in a context of investment in network infrastructure, SONAECOM believes that full coverage of the country should not be targeted, due to the cost of investment and size of the market, which means that many regions lack the conditions which would enable more than one vertically integrated service provider to exist¹²⁵. Therefore, given the objectives of social well-being, in the opinion of SONAECOM, full coverage of the national territory requires, a regulatory paradigm which focuses on creating conditions which foster the development of wholesale access offers.

VODAFONE reports that it is disposed to evaluate all investment opportunities, including the implementation of a solution based on NGA, which ensure the diversification of the service

¹²⁴ An essential issue for SONAECOM because, in the densest areas, the management of an optic fibre per customer, as implied by point-to-point, quickly became unmanageable and will therefore undermine the experience of the end-customer.

¹²⁵ In the context of making business decisions this can lead, according to the operator, to a gridlock effect, where no operator is willing to invest in areas with operational indicators which are potentially less favourable (which may result, in the first place, in a lack of investment in certain regions - with negative effects on well-being arising from such exclusion - or further, in the absence of effective competition, as a result of the market being captured by the "first mover" - insofar as high sunk costs constitute an entry barrier to potential competitors).

which it offers in the Portuguese electronic communications market. For that to happen, VODAFONE argues for the need for an NGA model which allows competition to take root, both in terms of services, and in terms of infrastructure¹²⁶, stating that due to the extremely high levels of investment required and uncertainty of return, its investment is heavily dependent on the legal and regulatory framework which will govern NGA¹²⁷, advocating in this respect predictability and the definition of remedies which enable the constraints expected in the implementation of NGA to be overcome.

As detailed in its response to questions 21 and 22, VODAFONE argues that the best option for ensuring investment in NGA is to form a consortium to plan, construct and operate a single network with coverage of the entire national territory.

Question 11: What technical limitations do you identify with respect to the coverage and choice of configuration and architecture for the various scenarios and solutions?

According to PT, the main technical limitations (which it considers will be common to all operators) are mainly related to:

- lack of space and difficulties in access to and installation of cabinets, conduits and other relevant soil and subsoil infrastructure; and
- difficulty of installing NGA optical solutions in buildings.

For PT, given the particular limitations of certain geographical areas, especially remote and inaccessible areas, NGA access must be provided, if warranted, through alternative technological platforms (e.g. VSAT and FWA/BWA).

In its response to question 9, ERICSSON indicates what it considers will be the main limitations to the development of NGA (e.g., the high cost of installing fibre optics and associated infrastructure), and identifies a variety of economic and technical options for the different FTTx scenarios.

According to COLT, the biggest limitation will be the choice of a technical solution which does not allow maintenance of the current LLU, reducing the range of offerings available to consumers.

ONI takes the view that the response to this question is also dependent on the model which is adopted for the development of NGA.

According to ZON, most of the technical limitations occur at the level of horizontal barriers (conduits without restrictions or manholes with space for the installation of joints) and vertical

¹²⁶ For this reason it reports that it has been carrying out significant investments in its network infrastructure, in particular in its third generation mobile network, as well as infrastructure for the provision of fixed broadband services, more recently based on an LLU strategy.

¹²⁷ Which, according to VODAFONE, needs to ensure the creation of transparent and non discriminatory conditions for the existence of real competition in the market.

barriers (access to telecom risers in buildings). With respect to these vertical barriers and to minimise their impact, it will be crucial, according to ZON, to ensure that the telecom risers of buildings allow shared access by operators. Besides these technical limitations, ZON is of the position that the procedural inflexibility and inconsistent SLAs of the RCAO limit the execution of operational and maintenance tasks. In this context, ZON supports the structural separation of PTC's wholesale business and the amendment of the legal horizontal property regime.

SONAECOM's response to this question was made in conjunction with its response to question 9.

According to VODAFONE:

- With respect to FTTCab architectures, one of the most important limitations is the lack of space in street cabinets, mostly owned by PTC, which has not shown itself open to sharing them. Another negative aspect, according to VODAFONE, lies in the local authority licensing process for new street cabinets, which it considers extremely protracted, complex and in some cases even impossible.
- With respect to FTTH architectures a serious limitation lies in the passive network inside buildings (i.e., the vertical network), resulting from the fact that the telecom risers of buildings are often of limited dimension, allowing, in most new buildings, the installation of only 2 or 3 operators, while in older buildings there is virtually no available space for the passage of fibre optic. A further limitation, according to this operator, is the horizontal passive network, in particular, the possibility of access to existing conduits. As far as VODAFONE is concerned, the existence of integrated information in electronic format on available capacity, as well as the expansion of the conduit offer to different entities (i.e. utilities), would constitute one way of overcoming this technical limitation.

Position of ICP-ANACOM

The majority of respondents indicated that an increase in demand for higher bandwidth could be expected, possibly as a result of new (more specific) services or the general roll-out of services such as IP-TV or VoD. Whereas, in the short term, ZON judges that there are no limitations to the provision of existing services, given the scalability of the cable network, the remaining operators take the view that only evolution to NGA based entirely on fibre optic will allow a response to these increases in demand for bandwidth.

ICP-ANACOM agrees that NGA, regardless of the technological support, will be essential to respond to the increasing bandwidth needs associated with developments envisaged in the use of networks, particularly in the area of television and web 2.0 (including games and applications with video) and approaches based on cloud computing.

Additionally, the launch of various new high definition TV channels (including sport content with high demand), along with the ever-growing appetite for higher speeds of access (to content), suggests that the limits of the current copper or coaxial cable networks will very soon be reached, even though coaxial cable networks may have greater capacity from the outset to support future needs in terms of television services. However, as already mentioned, fibre optic (access) networks seem to be the solution of the future for supporting any growth in bandwidth needs.

It also appears to be consensus that FTTH architecture is presented as the long-term solution, being more robust and more able to support future needs and having a level of capacity which is considered almost unlimited (in terms of transmission capacity/bandwidth), specifically in point-to-point solutions where there is no sharing of capacity. However, these point-to-point solutions appear to be confined, at least in the short and medium term, to specific projects and/or specific geographical areas and not suitable for widespread installation, mainly due to the requirement for high levels of initial investment.

In terms of PON types - point-to-multipoint solutions - GPON technologies based on Ethernet stand out, even though there are some drawbacks due to the need for more complex active equipment requiring more power and more demanding environmental conditions for installation. The interested operators consider that, currently, GPON technologies seem to be the most appropriate for a more rapid widespread roll-out of solutions based on fibre optics.

It is noted, from the outset that even PON solutions are not incompatible with the imposition of obligations of access, even at the level of (unbundling of) infrastructure, even though the implementation of this unbundling is more complex, for access to be shared¹²⁸.

The sharing of capacity will feature in point-to-multipoint solutions, whether in PON-FTTH solutions (including FTTB) or FTTCab¹²⁹. According to the respondents, the possible deployment of the latter architecture in Portugal does not appear to be a valid alternative in the long-term, despite being a solution which can be more quickly implemented on the ground or in areas where investment in networks consisting entirely of fibre optic is not economically viable. It is noted that account must be taken of the fact that the development of a fibre optic network with high capillarity would necessarily have high civil engineering costs (at a horizontal and vertical level, including the possible construction of conduits and the passage of cables in buildings).

In any case, ICP-ANACOM reaffirms that the decision on the type of technological solution, architecture or specific network topology to be adopted is one that must be taken by the

¹²⁸ In PON solutions, there is sharing of (one optical fibre from the splitter to the exchange) of several "accesses" (corresponding to different wavelengths).

¹²⁹ Note that in certain municipalities, according to the urban environmental concerns of the local authorities, the licensing procedures can be very complex and lengthy and may even prevent solutions which require large racks or a large number of racks (in the same area).

operators, taking into account the "state of the art" of the technology, the specific conditions on the ground (geography, demographics and type of existing infrastructure) and their business plans.

ICP-ANACOM, pursuing the principle of technological neutrality, will neither impose or favour any particular solution in this context. According to the same principle, the regulatory approach to NGA should not focus on any particular technology or solution, nor give incentive to the development of a given solution. In the first place ICP-ANACOM will seek to ensure that the objectives of regulation, such as the promotion of competition and the protection of citizen interests, are also guaranteed at this stage of evolution of the access network and supported services, taking account of the fact that different realities may give rise to different competitive or even regulatory issues.

ICP-ANACOM will always seek, as it has consistently done in the past, to develop a regulatory approach that promotes the investment of any operator, based on the definition of a "level playing field" with respect to the use and development of infrastructure (including optic infrastructure), in order to prevent and (if they exist) remove constraints to this development.

In light of the responses given by the operators, ICP-ANACOM highlights the interest shown in the development of new networks and solutions based on fibre optics, with more or less widespread roll-out (in some cases, there will be specific projects in certain areas), which leads to the belief that NGA will become a reality in Portugal in the short term. Indeed, the possibility of rapidly developing GPON solutions, cited by some entities, (albeit with certain technical or capacity limitations) appears to allow a rapid development of NGA supported services, even while these may be initially confined to certain more densely populated (urban) areas and/or higher income areas.

This situation has occurred with other broadband offers such as the RAPT offer which, starting in late 2000, only achieved coverage of all exchange areas in mid 2006 - while there is a protocol yet to be concluded between MOPTC and PTC to establish procedures for the financing of the investment needed to meet requests for access to broadband in inaccessible areas.

While it is naturally desirable that NGA, in particular NGA supported services, reach all parts of the national territory as quickly as possible, ICP-ANACOM recognises that the investment required to achieve this simultaneously in the short to medium term will be unacceptable to the market, not least because until recently major investments have been made and there are several ongoing investments in LLU, in cable networks and even in core networks. From the outset, it is expected that investments in (optical) infrastructure will centre initially on certain urban areas and areas with greater potential, and may expand later, based on the experience acquired and the evolution of demand, to less densely populated and/or more remote areas.

In this respect, ICP-ANACOM notes that the use of shared infrastructure, especially in these less appealing areas, may represent a more efficient approach to the challenge faced by the country, increasing the number of areas which have appeal for installation of NGA. In this context, ICP-ANACOM encourages this approach, particularly when adopted voluntarily.

According to the entities which responded, the two main limitations on the development of NGA are the so-called "horizontal barriers" and "vertical barriers", i.e., infrastructure needed for the - "horizontal" - installation of fibre optic technology (e.g. conduits or spaces in exchanges) in areas of coverage, and - "vertical" - installation inside buildings, to extend fibre to the customer's home.

With respect to these barriers, most evident in old buildings (and/or historical areas), specific intervention will be necessary in terms of the activities executed by ICP-ANACOM under the mandate conferred by the aforementioned Resolution and being exercised at this time (e.g. regarding the adaptation of the ITED regime); these matters are discussed in greater detail in a later section. From the outset, however, consideration should be given to the sharing of "vertical" infrastructure, thereby minimising the requirements of space and investment in this important component of NGA. It is noted that multiple replication of infrastructure in the same building by different operators will not be economic and/or technically feasible, a position which also appears to be taken by the operators and the European Commission itself¹³⁰.

There is a degree of similarity at the level of "horizontal barriers", even while access to the conduits of PTC is guaranteed through RCAO, because in certain areas these simply do not exist or are unable to support (several) new fibre optic cables. It is noted in this respect that consideration should also be given to the access branches of buildings.

These issues are also developed further in specific sections, while it should be emphasised from the outset that ICP-ANACOM will, also in this case, encourage the sharing of infrastructure, whether existing or constructed in the future - for example, with the potential sharing of the costs of construction, a very important cost component of NGA - and whether owned by operators or third parties (e.g. utilities or public entities such as local authorities), since, as recognized, certain limitations may exist with respect to the current conduit offer of PTC (e.g. lack of space in conduits for the installation of additional cables).

2.2.5 Evolution in Portugal

Question 12: Do you consider that there is sufficient information available on the access network (including APs and hybrid or fibre optic loops) and its evolution (including in terms of

¹³⁰ See, for example, whereas 7 of the proposed Recommendation: "*In addition, duplication of infrastructure should be avoided where it is impractical or undesirable, such as in-building wiring*".

network structure, technology and number of access points) over the short-term? What kind of impact do you envisage that this evolution will have on your current offers?

PT points out that the installation of new APs always has economical and/or technical justification¹³¹ with variable timings, which cannot always be controlled (e.g., construction of new urban developments), since the main reason for setting up a new AP is to satisfy demand for services with greater need for bandwidth.

PT states that is already obliged under the RUO to provide operators in a timely manner with information on the network (e.g., MDF, loops, numbering and works affecting service) and network alterations, specifically the upgrade of APs (including the number of transferable loops and the expected date for conclusion of the transfer). PT therefore considers that the information provided is (more than) sufficient for the purpose concerned, in particular so that operators have the information they need to conduct an analysis of the viability of co-installation in a given MDF. Additionally, it does not consider that the information provided is asymmetric, since the forecast plans provided to PTC by the beneficiaries of the reference offers have a distinct purpose, i.e. the sizing of the technical resources needed by PTC to provide the services in accordance with the agreed deadlines.

COLT argues that the information currently available on the access network is insufficient, unclear and often generates errors, whereby its development should be guided by the principle of transparency in the transmission of information.

According to ONI, the available information is insufficient and does not allow a perception of the evolution which the access network is due to undergo, an issue which causes difficulties in the planning of its technical and commercial activities. ONI adds that when it operated in the residential market, it was faced with innumerable situations where signed up customers could not be served because the eligibility information was incorrect and it foresees an aggravation of these problems due to the current process of remote loop enabling.

ZON says that it does not have enough information to answer the question.

As already mentioned in previous answers, SONAECOM believes that information available on the access network is inadequate, or even "*almost nonexistent*", at several levels:

- Remote concentration units (RU): According to SONAECOM, alternative operators have only partial information on a sub-universe of RUs and, for those which are known, reference is made only to the address, the number of existing loops and the associated numbering ranges¹³². Additionally, the company notes the omission of information on the conditions of co-installation in RUs, which prevents, from the outset, the analysis of potential interest in unbundling.

¹³¹ Improvement in the provision of services, to resolve problems of saturation, quality and/or coverage.

¹³² But even in this case, while it is not possible to determine *ex-ante* whether a particular telephone number belongs to the mother exchange or to the remote unit.

According to SONAECOM, no information is given by PTC with respect to the georeferencing of the loops and their characteristics¹³³.

- Attendance Points (AP): SONAECOM does not comprehend the making of a distinction between an exchange or an RU. It takes the view that any point of the network where local loop unbundling is technically possible constitutes an AP, whereby this is a term which covers main exchanges, as well as remote exchanges and street cabinets¹³⁴.

SONAECOM recognises that changes to the network (including the establishment of APs and relocation of loops) are aimed at improving services for the end-customer. However, SONAECOM states that in addition to the quantity of loops which, from time to time, is communicated to operators when APs are established, no further information is provided (including address, associated numbers, characteristics of the loops and co-installation conditions), despite approaches made to PTC with this purpose.

- Street Cabinets: Until the publication of the OVUM study, SONAECOM considered that the RUs and APs included the street cabinets, which apparently is not correct. SONAECOM does not know what distinguishes an AP or RU, or their characteristics and locations¹³⁵.

According to SONAECOM the above information is essential, insofar as it would make it possible to estimate the impact of the process of loop relocation on the business plans of the RUO beneficiaries¹³⁶. The possibility of discontinuing access points (RU, AP and street cabinets) has a severe impact on beneficiary operators and may bring into question the very viability of the investments which have already been made, whereby the possible lack of time to recoup the investment has negative implications on the level of competition. In this scenario, besides the need to fill the gaps in information identified above, SONAECOM argues that it is essential that there is predictability with respect to the evolution of the network. From this perspective, SONAECOM believes that the proposal presented in the consultation document¹³⁷ appears balanced. However the operator believes that 36 months

¹³³ Information which, according to SONAECOM, PTC necessarily possesses, otherwise the process of creating new remote units or APs would have no basis.

¹³⁴ However, according to SONAECOM, the regulator identifies about 2800 APs and at the same time, identifies more than ten thousand street cabinets, which is evidence of the inconsistency of information.

¹³⁵ SONAECOM takes the view that it is urgent to obtain answers to the following questions with respect to street cabinets: How many loops are comprised? What is the associated numbering? What are the characteristics of the loops in question? What is the geographic area covered by each street cabinet? Are there conditions for co-installation? What type of equipment do they contain?

¹³⁶ Especially in a context where the investments made on the basis of this offer are at risk of impairment, resulting in huge losses due to the characteristics of sunk costs.

¹³⁷ See section 2.2.5 of the consultation document: "*From the outset, a basic measure which could be taken to minimise the impact of these alterations, which could become structural and affect a large percentage of loops of a given exchange, is to extend the period of advance notice that PT Comunicações gives to the beneficiaries in proportion to this percentage. For example, one could set out a rule of the type: Advance notice of PT Comunicações of a minimum of:*

for the dismantling of an exchange is clearly insufficient, given the impact that this would have on the business of an operator¹³⁸, proposing that the period be extended to 5 years (stating that an exchange closure is planned far in advance, as part of a plan of structural change to the access network).

Besides the need for ensuring predictability, SONAECOM advocates the need to prevent the closing off of the market, through manipulation of the access network structure, and proposing that guarantee is made, inter alia, that:

- whenever a new street cabinet space is established, space is made available for operators which are co-installed in the respective "mother exchange", along with the conditions for the construction of a second cabinet by other beneficiaries who so wish;
- there is availability of space in the conduits which connect the "mother exchange" to the street cabinet, and if this is not possible, the availability of dark fibre;
- any new street cabinets (or APs or RUs) have a minimum number of customers so that the economic viability of its unbundling is ensured, or where this is not possible as a result of duly reasoned technical factors, a bitstream offer is provided on the date of the opening of the access point, allowing competitive offers which replicate those offered by the operator with SMP to the customers connected to the street cabinet concerned¹³⁹;
- where the co-installed operators at an exchange are not notified of the plan for remote enabling and where the co-installation of the beneficiaries in the new AP is feasible, a dark fibre connection is provided, without cost, between the exchange and the AP; and
- there are processes for the quick migration of customers which minimize interruptions to service and whose costs, as in the Dutch case, are borne by PTC, with consideration of the fact that the beneficiaries of the RUO are not responsible for these changes in the structure of the wholesale offer which they contracted.

In addition to the measures mentioned above, SONAECOM believes that there should be stronger discouragement of this type of behaviour through the imposition of an obligation on

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- 12 months, where less than 5% of the total loops are affected;
 - 18 months, where less than 10% of the total loops are affected;
 - 24 months, where more than 10% of the total loops are affected;
 - 36 months, where more than 50% of the total loops are affected or where the actual exchange/MDF is dismantled".

¹³⁸ Therefore, according to SONAECOM, the typical amortisation periods of equipment installed by beneficiary operators in the exchanges are clearly greater, whereby it does not accept a period of time which is shorter than that necessary to ensure such amortisation.

¹³⁹ According to SONAECOM, PTC has incentive to size new points of access so that they are not large enough for RUO beneficiaries to obtain a return on unbundling, arguing in these cases for a solution which is similar to that established in the case of Holland (*bitstream* offer allowing replication of the offers that the beneficiaries of RUO have with basis in this offer).

PTC that - whenever, conditions allowing replication are not guaranteed for alternative operators in new APs - the company provides payment of compensation to the operators who were co-installed in the deactivated exchange, defined in order to (i) ensure that these operators obtain a reasonable return on investments made and put at risk by decisions made by PTC; and (ii) above all, ensure that in its decision PTC incorporates the cost of opportunity associated with attempts to close off the market¹⁴⁰.

Also according to VODAFONE, the information currently provided by PTC on APs, the network structure and its evolution, lacks (i) quality and (ii) the adequate disclosure which would allow the beneficiaries of the reference offers to make decisions about their investment plans.

The quality problems identified by VODAFONE result from the use of different forms of access and formats of the information on the network as well as errors and inconsistencies in the information. VODAFONE further cites a lack of information on the location and number of loops of remote units and a lack of transparency about the concepts and definitions of information provided, whereby it cannot be properly processed¹⁴¹.

Regarding the disclosure of information, the concerns of VODAFONE relate to the limited advance notice with which information on changes to the access network is communicated, considering it necessary to impose a more extended period of advance notice, allowing the beneficiaries of PT's offers to incorporate the impacts of these changes in their investment and business plans in good time.

The alterations to the access network, as a result of its evolution and according to VODAFONE, constitute a significant constraint on the return on investments made by the alternative operators in terms of co-installation and investment in network capacity for access to the exchanges of PTC¹⁴². Meanwhile, VODAFONE comments that it is impossible to access customers who were migrated to new APs / RUs as a result both of the practical impossibility of co-installation in these points and of the smaller scale of the resulting fewer loops available, preventing the return on investment necessary for the unbundling of the new point.

VODAFONE does not consider that changes to the quality of information on the evolution of the access network, and the extent to which such information is disclosed in advance, is

¹⁴⁰ In this respect SONAECOME states, that in Holland there is also provision for the restitution of the RUO beneficiaries by KPN.

¹⁴¹ Arguing that the publication of the definitions of the various terms used by PT in its wholesale offers, particularly in RUO, is both urgent and essential.

¹⁴² As such, according to VODAFONE, the decision to invest in co-installation in a given exchange is made based on information provided in the reference offer with respect to the size (in terms of customers and access) of the market which can be reached through this exchange, considering the estimated acquisition of customers and the forecast return on investment within a defined time period. The evolution of the access network, implemented through the ongoing process of remote enabling, is, according to VODAFONE, altering the premises of scale underlying the economic viability of the investment because it reduces the initial size of the potential market.

sufficient to overcome or mitigate the negative impacts that result from changes in the access network. VODAFONE considers that only the evolution of wholesale obligations in a way which ensures that the beneficiaries can keep up with the evolution of the access network will be able to ensure competition in the provision of fixed broadband services.

Question 13: Do you agree with the proposed rule¹⁴³, and in particular with the definition of different deadlines, for giving prior notice of structural changes to the access network of the incumbent operator? Do you consider that other measures are necessary? If so, what measures?

PT affirms that it comprehends the establishment of different periods of prior notice for structural changes in the network, such as the possible closure ("*phase-out*") of MDFs, but states that the proposed rules raise questions, particularly with regard to the (unclear) concept of "affected loops" and the fact that the rules are not consistent with the development of NGA, whereby undesirable discontinuities and procedures which are incompatible with the current situation should not be created.

In this context, PT argues that the RUO already stipulates that PTC should report, with twelve months advance notice, all planned work which could affect the quality or performance of the provided service, including structural changes. According to PT, this period is generally adequate but that has proved, in some circumstances, excessive, given the dynamic evolution of PT's network. In this context, PT argues that it is not right that it is prevented from making such changes and from modernising its network or extending the scope and coverage of services provided.

PT does not consider it realistic that an operator in Portugal is currently able to provide detailed information on the evolution of its network over 2 or 3 years. It considers that the situation differs from the Dutch situation in that the agreements with the operators will have resulted from the macro planning made by KPN in the establishment of a new network, where the regulatory framework applicable to NGA is, to a large extent, stabilized.

According to PT, since it does not anticipate any move to "*phase out*" MDFs, the definition of different deadlines would not be timely insofar as, because there are MDFs with completely different dimensions and characteristics, it would not lead to a proportional and adjusted treatment, such as is proposed by ICP-ANACOM. In the view of PT, this is a matter which should be the subject of a specific study and, necessarily, of an agreement between the various stakeholders, especially in the context of the establishment of the NGA, since many operators are developing their own fibre optic solutions, independent of the RUO, which may affect the plans that were communicated to PT (which does not want to be constrained in the evolution of its network by the contingencies and alterations of the plans of the operators).

¹⁴³ See footnote 137 of this document.

PT suggests, moreover, that exceptional circumstances should be taken into consideration, related to unplanned situations, such as:

- an emergency situation or force majeure;
- the need to perform operations of control, adjustment or maintenance, in order to ensure the proper functioning of the network; and
- the execution of actions aimed at minimizing adverse impacts on the level of quality of service and expansion capacity of the offer of services to customers.

FCCN agrees with the rule proposed by ICP-ANACOM. It notes, however, that it would be preferable to have an evolutionary model in which the decisions of an operator do not impose changes on the others, since this simple dependence can be used for less savoury competitive practices.

CEGEA agrees with the imposition of a period of prior notice, varying in accordance with the number of loops affected. However, it suggests that a mechanism is included in the rule which takes into account the percentage of unbundled loops in the total number of loops affected, "*whereby the period of advance notice increases with the number of unbundled loops*". This proposal arises from the fact that a given alteration in an AP may affect few loops (in absolute terms) but a large proportion of these may have already been unbundled - i.e., with greater impact on the beneficiary operator - while another change at another AP might affect a large number of loops (in absolute terms) but few of these loops may have been unbundled.

Additionally, CEGEA believes that it should not be possible to relocate an unbundled loop where there is no possibility of alternative access¹⁴⁴, especially in the extreme case of the eventual decommissioning of the exchange/MDF. If it is proved that it is impossible to provide alternative access, CEGEA advocates that PTC provide the operator affected by the loss of customers with an appropriate level of compensation¹⁴⁵.

COLT agrees, in general, with the proposal, but argues that account should be taken not only of the percentage of affected loops but also of the investment made in each of the affected areas. Depending on the area in question, COLT believes that the proposed period of 12 months may be insufficient.

ONI agrees with the proposed rule, while advocating the adoption of other measures including:

¹⁴⁴ Arguing that the alternatives offered by PTC could be co-installation in the MDF or alternative products (bitstream type) which emulate, as far as possible, the products offered by the operator with the unbundled loop.

¹⁴⁵ While it is not ideal in terms of efficient investment (which has already been made by the affected operator), in the opinion of CEGEA, this compensation would enable the operator to make an investment which is probably less efficient than its original investment but would ensure that the competition in place is maintained.

- the presentation by PTC of their plans for NGA development in transparent form and with sufficient advance notice;
- no increase in RUO prices, whereas PTC shall support any increases in operating costs;
- no deactivation¹⁴⁶ of exchanges where there are co-installed operators and where the number of unbundled loops exceeds a certain limit, unless PTC supports the costs of migration to street cabinets; and
- the assumption by PTC of the costs of migration in the exchanges where there are co-installed operators but where the number of unbundled loops is below a set limit at which the costs of maintaining the exchange by PTC are deemed excessive.

ZON agrees with the existence of different periods, taking the view that this is a positive solution for the framework of the issue. It considers, however, that the definition of a percentage of loops to be deactivated might not be suitable given the needs of the operators which base their offers on this service. Therefore, it comments that an alternative might be the importance of the capillarity of the offers of the operators (i.e., the areas which are most relevant to the alternative operators will be the last to be decommissioned).

SONAECOM responded to this question in conjunction with the previous question.

VODAFONE agrees with the proposed rule for differing periods of advance notice of structural changes to the access network of PTC, considering, however, that it is necessary to ensure that the dates are reported for the commencement of such changes (which always comply with the established notice period) and that the loops and areas which will be affected are identified.

Position of ICP-ANACOM

The provision of timely and adequate information (on the evolution of the access network) is fundamental for achieving the principles of non discrimination and transparency, while ICP-ANACOM is charged with verifying compliance, allowing healthy competition and balanced market development, insofar as all operators are able to make informed investment decisions with information that is, to a greater extent, more in line with the information which is available to PT.

In this context, PT and the beneficiaries of RUO appear to take opposing positions, with PT considering that it already provides more than enough information and the beneficiaries of RUO expressing a contrary position, arguing that the information currently available, besides its scarcity ("*almost inexistent*", according to SONAECOM) is not clear and sometimes contains errors.

¹⁴⁶ For a suitably long period of time.

PT's assertion that the national situation differs from the Dutch situation, in which the agreements made with the operators will have resulted from the macro planning made by KPN in the establishment of a new network, where the regulatory framework applicable to NGA is, to a large extent, stabilized, is unfounded. It is noted that in Holland, it was the plans announced by KPN that resulted in a broad discussion and an attempt to define the regulatory approach, and not the opposite¹⁴⁷.

ICP-ANACOM has followed these matters, especially the latest developments in the establishment of APs and the "relocation of loops", having sought to ensure, including through interventions with respect to PTC, that the operators are informed with due prior notice in advance of (more structural) changes in PTC's network which may affect their RUO based offers.

If it is true that base information currently provided by PTC at this level appears to meet the requirements of the RUO in general terms, albeit with a need for greater effort in the correction of errors and/or inconsistencies (e.g. the information about eligibility or numbering), it is also true that this information, as well as (and fundamentally) the period of advance notice with respect to its transmission, may not be adequate at this stage of transition, in which investments in LLU by the beneficiaries of the RUO occur alongside the prospect of the evolution of networks to the extension of fibre optic closer to the street cabinets and customers.

ICP-ANACOM also acknowledges that there is some lack of clarity in the information provided by PTC, specifically in terms of the concepts of AP and in terms of the relationship of APs with MDFs, URs and even the local exchanges themselves. The basic structure of PTC's access network should be clearly defined and presented, while the information made available to beneficiary operators should be consistent throughout. The responses received clearly set out the view, confirmed by the recent experience of ICP-ANACOM in its analysis of these issues, that the concepts and definitions relating to network infrastructure need clarification in order that there is harmonised, clear and unequivocal understanding thereof.

Additionally, it must be ensured that the operators are provided with information which is strictly necessary for the development of their networks and LLU based services - for example, the exact location of APs whatever their type (local exchange, MDF or RU), their geographical coverage and details of associated numbering - as well as any developments planned by PT at the level of access networks which may affect this development.

The revision of the rules associated with the provision of information by PTC and the content of such information will be included in a decision on amendments to the RUO to be taken in the near future.

It is reported in this respect that the draft Recommendation of the Commission states that the regulators should ensure that operators with SMP provide interested operators with

¹⁴⁷ See, in this respect, Annex 1 of the consultation document.

information (in a format and to a level of detail to be defined by the regulators) on plans for the development of the network as appropriate so that said interested operators are able to plan and coordinate their investments¹⁴⁸.

In this context, special concern centres (besides the addition of new APs and "*relocation of loops*") on the possibility of access points being discontinued (remote units, attendance points or street cabinets), which may occur in a scenario of widespread evolution to NGA. ICP-ANACOM recognises that a high occurrence of these situations may in fact have a large impact on beneficiary operators of the LLU and on the sustainability of executed or planned investments, with negative implications for competition and consequently for consumers.

It is reiterated that ICP-ANACOM, in the definition of an approach which is consistent and coherent with the objectives of regulation enshrined in law, and of current regulatory practice, will seek to ensure that no disruption will occur to the functioning of markets, particularly in the wholesale access markets. In this respect ICP-ANACOM may intervene at the level of wholesale offers (especially the RUO) - in compliance with the obligations of access, transparency and non-discrimination imposed on the operator with SMP -, adapting said offers and improving them in specific aspects.

ICP-ANACOM recognizes, as previously stated, that PT should be free to develop its network and services as efficiently as possible for the benefit of its customers. Since the promotion of efficient investment in networks, particularly in NGA, is one of the objectives of this Authority, any restrictions or limitations on such investment should be minimal.

However, given the existence and maintenance of obligations of access, non-discrimination and transparency imposed on PT as holder of SMP in wholesale access markets, this objective does not invalidate the requirement that PT shall continue to comply with certain rules in respect of the provision of information on the development of its network, which information is essential for operators which are beneficiaries of offers supported on this network.

It is not intended that PT provide its competitors with commercial information, which is confidential in nature, but that, with a reasonable period of advance notice, PT provide all the information which enables operators, just as it enables PTC, to determine at any moment which investments should or should not be undertaken with respect to the development of their networks and services, in order to derive an adequate rate of return. Indeed, PT itself affirms that it "*comprehends the establishment of different periods of prior notice for structural changes in the network*".

There is consensus that investments in electronic communications networks are investments which are (very) long term, sometimes surpassing economic, regulatory and political cycles.

¹⁴⁸ para 10, page 6: "*NRAs should require the SMP operators to provide interested parties with appropriate information concerning its future network modification plans to the extent necessary for planning and coordination of the access seeker's investments and NRAs should define the format and level of detail of such information*".

It is therefore of utmost importance to seek maximum stability, consistency and predictability in the market, predictability which PT also advocates for their own investments.

Obviously, changes will occur during the evolution to NGA, with potentially large impact on existing networks and services¹⁴⁹, whereby it is essential to provide clear rules from the outset governing the timely provision of information on this evolution with a reasonable time horizon given the long-term nature of most of the investments.

The proposed rules applied mainly to structural changes in the network, such as possible deactivation of MDFs, as well as to cases where "relocation of loops" occur (e.g., through the establishment of a new AP), which, if this involves an MDF where operators are co-installed, directly affects the operations of these operators in said MDF. The "affected loops" are the active loops which are "relocated", whereas the percentage is calculated in proportion to the total number of active loops¹⁵⁰. ICP-ANACOM, not intending to create (new) complex procedures, considers this to be a reasonable criterion to quantify, in a simple manner, the potential impact of network changes on LLU.

On the other hand, it continues to accept that unplanned (and, by nature, temporary) situations - such as situations of emergency or force majeure or the need to perform control, adjustment or maintenance operations, as referenced by PT - are considered exceptional conditions, even though they should be subject to minimum prior notice (in the case of operational and maintenance operation), as set out in the RUO.

Therefore, in light of the comments received and the review conducted by this Authority, the following may be set out as a simple rule, to be considered in any future determination of ICP-ANACOM on the RUO:

"Advance notice of PTC with a minimum period of

- *12 months where the number of active loops to be relocated is less than 1/3 (33%) of the total active loops in the MDF;*
- *36 months where the number of active loops to be relocated is more than 1/3 (33%) or where the MDF itself is to be deactivated".*

Given the number of operators actively using the LLU (i.e., the MDFs) and the size of the MDFs, the threshold of 1/3 (of active loops) meets the criteria of reasonableness, in view of the possible impact of lower thresholds¹⁵¹ or higher thresholds¹⁵².

¹⁴⁹ See for example, the Dutch case.

¹⁵⁰ It is noted that, normally, in any MDF, the total number of loops in the distribution frame (in operation or not) is much higher than the number of active loops, but given that the biggest impact will be at the level of active loops, it was decided to use this simplification.

¹⁵¹ In this case (eg, 10%), most of the alterations proposed by PTC would be submitted with a period of 36 months, which would limit PTC's freedom of action with respect to the structure of the access network.

¹⁵² In this case (eg, 50%), the majority of the amendments proposed by PTC would be submitted with a period of 12 months, which would have a large impact on co-installed operators and on their capacity for adapting to the alterations.

In any case, the loops which are already unbundled (or to be unbundled prior to the "relocation"¹⁵³) for an operator co-installed in a given exchange should not be relocated without checking whether there is a possibility of alternative access, otherwise the end-customer will lose the service of this operator or the operator will have to be co-installed in the new PA(s), even if against their will, assuming that this is feasible, which in many cases it may not be given the type of installation in which these APs are established.

Accordingly, even with prior and timely information, it is necessary to examine to what extent such change(s) put(s) at risk investments which have already been made (or which are due to be made in the meantime) by the beneficiary operators. It is also necessary to guarantee that any costs arising from the change are not passed on indiscriminately and disproportionately to the beneficiary operators, which could constitute a double penalty for the alternative operators, since the impact itself of such developments on the downstream markets will probably be very negative for these operators (e.g. lower number of potential customers, leading to lower revenues).

The proposed Recommendation recognizes these concerns, providing that when the alternative operators co-install their equipment in the spaces of the operator with SMP, a reasonable period should be guaranteed whereby, in the light of changes (in network), such operators may decide on their commercial and investment strategy. It is further noted in this context that, before the operator with SMP removes installed infrastructure (to reduce its costs), regulators should ensure, through the establishment of a proper process of migration, that the alternative operators continue to offer their services at retail¹⁵⁴.

In this respect, ICP-ANACOM accepts that changes to the rules (scope and length of prior notice) governing the disclosure of information on the evolution of the access network may not be sufficient to overcome any negative implications for beneficiary operators which may result from such developments. Also for this reason, this Authority takes the position that these impacts should be examined from the outset, along with the need to amend the wholesale access offers, to ensure (at least) that current levels of competition in the provision of retail services are maintained. These possible changes are discussed in a later section.

¹⁵³ It is noted that PT may not prevent an operator from choosing to continue the process of loop unbundling, even after giving prior notice, in exchanges where the operator is already co-installed. Otherwise, there is a risk of encouraging changes in the network "only" in order to restrict LLU.

¹⁵⁴ See para 9, page 4: "*Where competitors have equipment collocated at the SMP operator's sites, they will need a reasonable transition period to decide on their investment and business strategy to cope with the changes. Accordingly before an SMP operator removes existing infrastructure to realize cost savings, NRAs should ensure competitors can continue to provide services by means of a proper migration path*".

2.2.6 FTTCab and FTTH/B solutions and the impact on LLU

Question 14: From an economic standpoint, and in function of the expected costs (e.g. fibre optic connection and adaptation or installation of street cabinets), do you consider FTTCab to be a viable solution only for streets cabinets with greater capacity and/or located in urban centres or, possibly, at a more global level?

PT reported that its FTTCab solution is embodied by micro-coverage with ADSL technology in street cabinets. This solution implies greater proximity to the premises of the end-customers, determining that each street cabinet serves a more limited number of customers, resulting in higher customer connection costs, although, by being ADSL (existing network technology which is less demanding with respect to the characteristics of the loop), these cabinets can be spread across locations with different characteristics and not just in large urban centres. The same no longer occurs, according to PT, with solutions based on VDSL2, with technical and economic constraints which are substantially different, heavily penalizing the economic and financial viability of these investments¹⁵⁵.

Additionally, PT states that the implementation of FTTCab involves replacing sub-distribution frame cabinets and installing new cabinets adjacent to existing ones or in new locations¹⁵⁶.

In any case, PT believes that the viability of FTTCab solutions, as well as the conditions of access to the copper sub-loop, depends on a detailed analysis of the technological options, technical conditions and economic sustainability (e.g., services, revenue, geographical coverage, core infrastructure costs and access per passed home or municipal licensing for cabinets and any potential infrastructure).

The feasibility of broad development of FTTCab or FTTH solutions will, according to ERICSSON, depend on the business model and the competitive situation perceived by the operator.

FCCN referenced the importance of the initial fixed investments associated with an access network, indicating that the access models should allow different technical solutions enabling those who invest in infrastructure to choose the most suitable solution according to their business model.

¹⁵⁵ Technology which is new, involving large investments in the acquisition of new equipment (VDSL ports) and infrastructure (cabinets or fibre optic cables). From a technical point of view PT notes that the length of the loop in the case of VDSL2 is necessarily very short, which requires cabinets to have a very reduced area of influence, contributing to the unfavourable economic conditions associated with the widespread introduction of this technology.

¹⁵⁶ Due, according to PT, to the following reasons:

- existence of sub-distribution frame cabinets without capacity for the installation of cable output blocks;
- lack of sufficient space for housing DSL concentration equipment in cabinets of copper sub-distribution frames;
- different lengths of the copper loops to the location of cabinets for broadband services and voice services (which correspond to existing cabinets); and
- locations for the cabinets of copper sub-distribution frames being insufficient in number for FTTCab solutions.

CEGEA believes that the answer to this question requires a more detailed analysis of the access network, and that therefore it is not possible to suggest a global solution at a national level. In this regard CEGEA indicates that it would be useful if there was an accurate and updated register of PTC's access network¹⁵⁷.

As far as COLT is concerned an FTTCab solution will not be viable, because it believes that access must be allowed regardless of the location or the size of the street cabinet.

ONI takes the position that an FTTCab solution will only be viable in urban areas of greater density and with larger street cabinets. The remaining geographic areas may be limited, according to the operator, to the PON type solutions or bitstream.

According to ZON, from the outset, an FTTCab solution would suit any area, regardless of the capacity of the street cabinets. According to ZON, it is desirable in a scenario of shared optic resources that the last common point is located so as to enable the operator to select the best technology for entry into the residence / building of the customer. However, ZON believes that the cost of adapting cabinets may be considerable compared to FTTH/B solutions. It adds that the FTTCab solution may not be viable if the section of the secondary network is very long or is in poor condition.

As already mentioned, SONAECOM gives preference, in a context of developing its own network, to an FTTH network. However, SONAECOM also take the position that FTTCab assumes particular relevance in the process of remote enabling of loops.

Given the position expressed in its reply to question 12, SONAECOM considers that the measures it proposes here respond to this question, both in terms of the situation of creating new street cabinets and in terms of the situation of addressing the issue of existing street cabinets. This obligation must be global, in SONAECOM's opinion, insofar as it relates to the need to safeguard the viability of the RUO, as an offer which is essential to the implementation of an investment ladder logic in the national territory.

According to SONAECOM, the hypothesis accepted by the regulator of access limited to the larger street cabinets ignores the fact that PTC will have cabinets installed in an atmosphere of total secrecy, despite being subject to obligations of transparency and non discrimination. In this context, not to act in all areas in which such behaviour has been recorded, in the opinion of the operator, amounts to an acceptance of manipulative behaviour, with respect to a regulated asset, which has the purpose of excluding competition from the market.

As stated in its response to question 9 on an FTTCab topology, VODAFONE is of the view that an FTTCab solution would be undesirable considering that such a solution does not create conditions enabling the existence of competition in the market for fixed broadband services.

¹⁵⁷ According to CEGEA this register would be useful not only for PTC, when drawing up plans for the NGA, but also for other operators when taking decisions on planned investments.

VODAFONE identifies the following costs associated with FTTCab solutions:

- direct costs, arising from the deployment of the network;
- indirect costs, resulting from delays associated with municipal licensing for the installation of street cabinets; and
- indirect costs, resulting from delays in access to the sub-loop.

According to VODAFONE, in areas of higher urban density, the second factor will have the most bearing (municipal licensing), while for areas of greater population dispersal it will be the first factor. The third factor, according to VODAFONE, constitutes an impediment in the event that regulatory measures are not taken to remedy the bureaucratic and procedural issues which have been the cause of delays. A possible solution to overcome the difficulties inherent in this factor would be, according to VODAFONE, the functional separation of PTC with the creation of an autonomous management unit which deals with all its customers in a transparent and non-discriminatory manner with respect to its wholesale products of loop and sub-loop unbundling.

VODAFONE adds that the current monthly price set in RUO for a sub-loop (equal to the price for a loop), hampers the recovery of the investment of an alternative operator in a reasonable timeframe, since the number of loops covered (potential customers) is reduced dramatically in the transition from exchange to street cabinet, while network development costs rise exponentially, due to the need to cover a much greater number of street cabinets to achieve the coverage provided today by the exchanges.

Question 15: From a technical and economic point of view, do you favour a solution in which the streets cabinets are individual (per operator) or do you favour a shared solution? On what terms?

According to PT, the existing cabinets were neither designed nor sized for shared use or for future solutions with shared space (e.g., co-installation and RCAO). PT argues that in addition to the aggravation of the constraints placed by local authorities on the installation of these (major) pieces of equipment in the public domain, such sharing, even if theoretically possible, has a marked complexity and poses practical problems and high development costs which will harm the feasibility of a solution of this type.

PT takes the position that the options for the unbundling of the copper sub-loop face restrictions which will be difficult to resolve in the immediate future, whereby the operator favours a solution of individual cabinets. In this context, PT considers that the FTTCab solution (if economically feasible) depends in good measure on public and local authorities providing suitable conditions, stating, for example, that Lisbon Municipal Council wants the cabinets to be buried, which further increases the costs associated with this solution.

As a supplier of equipment, ERICSSON reported that it covers the entire range of solutions, and that practical implementation is dependent on each operator's business model.

FCCN believes that the ideal option would be for street cabinets to be shared, which could reduce the overall level of investment by all the operators. However, it considers this to be dependent on regulation which ensures and enforces effective access to and availability of these shared resources.

CEGEA states that it is not possible to give a precise answer to this question, arguing that if competition between networks is favoured, a solution based on individual cabinets should be adopted¹⁵⁸. CEGEA states that adopting a shared solution would reduce the cost of deployment, but with fewer competitive benefits. The ideal solution, according to CEGEA, is one that produces benefits in competitive terms associated with competition between networks (individual cabinets per operator) without the need to bear the costs of its deployment. In this respect, it supports more detailed analysis of the British solution of separating the access network of the incumbent and implementing a system of incentives which favours competition between operators.

COLT believes that the most viable economic solution is cabinet sharing, but always subject to consultation of all operators with respect to their interest in sharing in a determined geographical area, with responses provided within a reasonable time.

ONI supports a solution in which NGA is developed in a planned and integrated form by a single entity (which may be a consortium of operators or a company established specifically for this purpose) and then provided under an open access scheme to all interested operators.

From a technical standpoint, ZON believes that there is no impediment to sharing cabinets. Meanwhile, from a logistical and procedural standpoint, ZON considers that the intervention of several operators in shared cabinets requires the registration of their activities by the entity which owns and manages the single access network¹⁵⁹. According to ZON, a compromise solution is a cabinet with a common part and parts restricted to each operator.

As mentioned above, SONAECOM argues that the shared solution should be favoured, within a context of predictability of demand, which means giving priority to operators which are co-installed at the exchanges where the loops have origin. In cases where the street cabinets house the loops of exchanges which have not been unbundled, SONAECOM considers that the market should be consulted to gauge the effective interest of the beneficiary operators of the RUO, which consultation should run in parallel with the process of prior notification referred to in its response to question 13. In particular, SONAECOM

¹⁵⁸ Suggesting further that an analysis is made of the competitive benefits associated with this model relative to the costs of its implementation.

¹⁵⁹ As detailed in its response to question 21.

stresses the importance of said requirement to ensure that there is room for individual cabinets in the vicinity of PTC's cabinet¹⁶⁰.

As far as VODAFONE is concerned, the installation of street cabinets by individual operators, in any implementation of an FTTCab solution, does not make sense either in terms of economic efficiency, from a technical point of view, or in terms of urban planning. If the topology of NGA to be implemented is FTTCab, the shared solution is the only one which, in VODAFONE's view, does not severely limit the appeal of investment by alternative operators.

According to VODAFONE, this solution would not be free from risk, whereby it supports the definition of the following requirements to promote a trouble-free co-existence (particularly in terms of use of space and energy) between the various operators that share space in the same street cabinet:

- the location of street cabinets and the plans for putting them into service should be made known to the alternative operators at least 6 months in advance¹⁶¹ (possibly with post hoc adjustments);
- in the plan referred to initially, PTC should not only provide notification of the location of street cabinets, but also the numbers of each line and the addresses covered by the cabinet as well as an estimate of the length of the loop;
- definition of the internal use of the street cabinet and its size would be decided jointly by PTC and the beneficiary operators;
- in view of the imposition of space restrictions by the majority of local authorities, it would be necessary to set a maximum limit of three co-installed operators in each cabinet with each one holding just one sub-rack with guarantees of use.

Question 16: From an economic point of view, and in function of the expected costs (e.g. fibre optic connection to homes and possible adaptation of buildings to receive fibre optics), do you consider that it is viable to develop optical fibre outside areas of high population density and new construction?

According to PT, FTTH/B solutions would require huge investments, which in the short and medium term will be focused only on areas with high socio-economic development characteristics (certain areas of Lisbon, Porto and other major cities, especially along the coast). The expansion of these networks into other areas will be slower (unless executed in a context where there is use of public funds) and always preceded by a careful analysis of business potential and profitability.

¹⁶⁰ The position of APRITEL is reiterated in that such conditions should exist within a radius of 30 metres.

¹⁶¹ So that the operators can prepare geographically targeted marketing campaigns in good time and under the same circumstances as PT.

In general, ALCATEL-LUCENT recommends competition based on infrastructure, with public intervention limited to the creation of a favourable investment climate, providing suitable local conditions, i.e., easy access to conduits and to vertical cables inside houses.

According to ERICSSON, the feasibility of developing a broad range of FTTCab or FTTH solutions depends on the business model and the competitive situation seen by the operator.

FCCN believes that, initially, it will not be feasible to develop optic fibre in areas other than those with high population density or new construction. However, it accepts that with the emergence of more economic installation techniques and subsequent economies of scale, a gradual enlargement of the fibre optic network will become possible. FCCN indicates that in areas with lower population density it makes sense, also as a way of reducing the digital divide, to promote the reuse of conduits and infrastructure with basis in public funding.

CEGEA considers that more detailed economic data would be useful in responding to this question. However, it states that literature suggests that viable development of fibre optic solutions in areas with low population density is unlikely.

COLT does not consider that such a large investment outside areas of high density or new construction is possible. However, it takes the position that if the conditions of the RUO are maintained, it may not be necessary to extend fibre optic to other more remote areas.

ONI does not consider it viable to develop fibre optic outside areas of high population density or new construction, but acknowledges that the development of optic fibre in other areas may be carried out if incentives are provided by the Government.

According to ZON, if account is taken of the strategic interest of NGA with respect to Portugal's development, the development of fibre will require national coverage, with this development also being dependent on the availability of new services which can be provided to users with this technology. ZON adds that the fight against info-exclusion and the reduction of technological asymmetries in Portugal are supported by the provision of such services, with all citizens having access to the same bandwidth and the same prices, irrespective of their location.

SONAECOM considers that the parallel construction of different FTTH networks throughout the national territory would not be feasible (nor is it in any European country). The challenge, according to SONAECOM, is how this impossibility can be overcome. Existing limitations are related, according to the operator, to the extreme sensitivity of FTTH networks to factors such as population density and the concentration of population in buildings with multiple dwellings, which two positive factors are combined in the large urban centres. Outside large urban centre, according to SONAECOM, costs trend higher with respect to the various components:

- Horizontal network: it is more extensive and the point of local unbundling, with a coverage of a radius of about 15 km, covers fewer people, whereby it will be more difficult to recover the investment involved.

- Vertical network: serves fewer families since there are typically fewer dwellings in each building.
- Higher costs of connection to core: The fact that the *core* of the network, as a rule, mirrors the large urban centres, meaning that the links to the areas which are furthest away from the core require a level of investment which is considerably higher.

It is in this context that SONAECOM supports the creation of an entity whose mission would be to provide the integrated management of essential assets (e.g. conduits, manholes and poles) in order to develop a wholesale network which responds effectively to the needs of the various operators present in the market¹⁶². This alteration seems to be, according to SONAECOM, essential to the creation of "level playing field" which makes it possible for all operators to carry out the development of optic fibre under equal conditions.

Functional separation has, according to the position taken by the operator, the additional advantage that it allows the principal costs associated with building a network (both vertical and horizontal) to be shared among all the operators that use it, and at the same time, if properly established in terms of objectives, provides incentives to create offers aimed at the real needs of operators.

The viability of a business plan which includes the implementation of a fibre optic network at national level is, according to VODAFONE, heavily impacted by whether or not the entities have conduit networks in place in areas of lower population density and also depends on expectations of levels of demand and purchasing power as well as the number and height of buildings.

For these reasons, as has been explained, VODAFONE believes that the development of fibre optic network throughout the continent and the autonomous regions, thus covering both areas of high population density and the interior of the country, can only be ensured by NGA if there is involvement of the public sector, local authorities, entities owning infrastructure and access networks as well as all operators, including PT.

Question 17: What technical and procedural or legal challenges do you consider may impede or limit the development of FTTCab or FTTH/B solutions? Please identify measures which might minimise these problems.

According to PT, the installation of FTTCab and/or FTTH solutions faces horizontal and vertical barriers, which affect all operators, including PT. With respect to horizontal barriers, PT states that, despite the availability of the RCAO in Portugal, the effects of the following may have increased impact when associated with other aspects:

¹⁶² SONAECOM recalls in this respect, the scope of the commitments to which it was bound in 2006 in the context of its offer to acquire PT, approved by Autoridade da Concorrência (the Competition Authority). In the event that SONAECOM were to proceed with the divestment of the cable network at the time controlled by PT Multimédia, the core network would be subjected to vertical functional separation.

- Access to other underground infrastructures, in particular access to conduits owned by other entities;
- Local authority regulations in force, which hinder access to the public domain for the purpose of installing new equipment, such as street cabinets. PT further states that the installation of infrastructure for electronic communications will depend on the payment of fees other than MFRW¹⁶³.

With respect to vertical barriers, PT refers to its response to questions 40 and 41.

ALCATEL-LUCENT comments that¹⁶⁴ with NGA access to passive infrastructure (including conduits) is the main driver of investment, allowing replication of the network and competition between infrastructures, providing the best basis for sustaining competition, investment and innovation¹⁶⁵. It therefore advocates the sharing of passive infrastructure (e.g. conduits), which can provide an overall reduction of costs (to the order of 40% to 60%). It indicates that this sharing is currently structured on three levels: (i) vertical dark fibre in buildings, (ii) conduits and or dark fibre in the access network and (iii) wholesale IP/Ethernet services.

According to ALCATEL-LUCENT, this sharing potentially limits the activities of operators, whereby any problems should be resolved at the planning stage (e.g., demarcation of public and private responsibility and guarantee of commercial, operational and architectural neutrality). ALCATEL-LUCENT's experience in designing and implementing FTTH solutions (GPON and point-to-point, for different operators) demonstrates that the following challenges need to be faced:

- infrastructure operators should focus on the point-to-point implementation of dark fibre (up to a node), shared in the last segment to home (e.g., in the basement of the building);
- (passive) infrastructure operators should only construct/reuse (distribution) conduits up to the node of the network operators;
- at the junction of these two infrastructures, there should be a fibre optic connection point, where the network operator may install a splitter or optical distribution frame (ODF);
- local communities should create an inventory of passive access infrastructure;
- it is necessary to develop pro-active efforts to eliminate barriers to fibre optic cabling in buildings, with the implementation of standards (for contracts, cabling and operations) and legislation for new buildings.

¹⁶³ In this respect PT refers to its response to question 34.

¹⁶⁴ Included in the joint response to questions 11, 14 to 19 and 22.

¹⁶⁵ For example, the provision of alternative services is more developed with the impetus provided by LLU than in areas served only by bitstream (IP).

As far as ERICSSON is concerned, access to relevant locations and issues of rights of way may restrict the development of new fibre optic access infrastructure. This may be encouraged through legislative measures which facilitate the installation of equipment by operators in appropriate spaces.

FCCN considers that the procedural challenges and the challenges of the legal and regulatory framework, are greater than the technical challenges. In this regard, FCCN stresses the importance of the distribution model within the condominiums, not just through the adaptation of ITED, but also through the rules governing the maintenance of NGA within this private domain. FCCN considers that it is essential to have great regulatory rigor with regard to all the shared resources, whereby the regulator must ensure effective supervision and the application of appropriate penalties on any offenders.

According to COLT, the most important challenge is represented by the investment required of operators to develop FTTCab or FTTH/B solutions, to gain access to a particular consumer. The sharing of street cabinets and infrastructure in buildings may be a further factor limiting equal access for all operators.

ONI identifies the main technical challenges as:

- the (un)availability of space for co-installation in street cabinets and in buildings and space in conduits (both for access to street cabinets, and inside buildings);
- the adoption of PON solutions without adequate planning which allows the unbundling of fibre optic or wavelengths.

and the legal challenges as:

- the licensing procedures at a local authority level for installing resources on the public highway which procedures it considers protracted;
- authorisations granted by condominiums for the installation of resources in buildings.

In terms of solutions, ONI suggests establishing an entity which is responsible for the construction and installation of NGA (company or consortium of operators), which subsequently makes the network available according to terms of open access to all interested operators. From an administrative point of view, ONI argues that the construction of NGA should constitute a national strategic objective, whereby changes should be made to local authority licensing procedures and condominiums authorisations which are necessary to speed up such processes.

According to ZON, the main difficulties experienced relate to:

- vertical barriers arising from the existence of common spaces that do not meet the technical requirements in older buildings and the difficulty of obtaining approval from condominium owners for the installation of new equipment/infrastructure¹⁶⁶;
- installation of street cabinets, due to lack of space and the need for local authority permissions for the implementation of new cabinets; and
- access to conduits.

To this purpose, ZON refers to the need for structural separation¹⁶⁷.

Measures that could be taken to minimize the difficulties identified, include, in the opinion of ZON, the creation of a system similar to ITED for older buildings, allowing the installation of new infrastructure, and the standardization/simplification of local authority procedures for granting authorisation for the installation of new cabinets.

As part of an FTTCab solution and with respect to the technical aspects, SONAECOM considers that there is nothing more to add beyond the constraints already identified in the discussion about street cabinets in previous questions. From a regulatory point of view, SONAECOM considers that the imposition of the advocated measures for the phase of coexistence between the historic network and the new networks and the phase of migration is compatible with the current regulatory framework, insofar as it provides a guarantee that an obligation to grant access to infrastructure such as copper is not circumvented through the manipulation of the regulated asset itself. In competitive terms, such behaviour¹⁶⁸ constitutes, according to SONAECOM, situations of "*constructive refusal to supply*".

Already in the case of FTTH solutions, SONAECOM believes that, depending on the types of network, it may prefer unbundling of fibre optic in the case of existing clients or, in the case of new customers, access to dark fibre. The issues raised in the context of the unbundling of fibre optic in GPON are, according to the position taken by SONAECOM, very similar to those which currently exist in respect of the RUO, in that it is also necessary to examine the conditions of co-installation and provide a degree of standardization in terms of equipment used. In this context, it is relatively clear to SONAECOM that network architecture that does impede the practicability of the solutions which it considers suitable for implementation.

Regarding the existence of regulatory conditions which support any imposition of such offer (dark fibre, in particular), SONAECOM recalls that the new Market 4 was defined precisely to ensure this solution, whereby it is fully compatibility with community and national rules, provided that imposition is executed through the legal process of market analysis.

¹⁶⁶ ZON provides further details on this issue in its response to question 40.

¹⁶⁷ See details given in the response to question 25.

¹⁶⁸ Alteration of the conditions of the asset in order to prevent access by third parties.

With regard to issues of a more wide-ranging nature, associated with the national legal framework, SONAECOM highlights the problems related to access to buildings (for installation of the vertical network) and those associated with interaction with municipalities.

In the first case, SONAECOM draws attention to the processes incorporated by the current ITED system. Specifically, SONAECOM states that operators are faced with various difficulties arising from the fact that buildings, both new and existing, are not designed for a direct fibre optic link, for the reasons given in the following table (in which SONAECOM also presents its proposed solutions):

Issue	Solution proposed by SONAECOM
The technical spaces for the installation of the CPE - which, given that the historical network is bulky and requires active and passive ventilation systems - are not suited to the reality of FTTH.	-
The internal cable to the dwelling - <i>in-house wiring</i> - in most cases is not designed in consideration of the fact that the <i>bundle</i> of services offered by operators needs to reach each room. ¹⁶⁹	All the sockets in all rooms should have cable and data heads, thereby ensuring equality and ease, both in terms of use of technologies over coaxial cable and in terms of technologies over UTP cable.
There are services which are in full development, but where it is not possible to accurately predict the final outcome in terms of availability.	ITED needs, on a mandatory basis, to ensure the existence of vacant conduits for later use by the customer or service provider.
Today's telecom riser only provides for the installation of copper pairs.	Telecom risers should provide for the inclusion of fibre optic, ensuring that the base infrastructure equips the property with the conditions necessary for the provision of NGA ¹⁷⁰ .
ITED favours cable operators over other operators of electronic communications.	The points of recommendation and the training to be undertaken with respect to ITED incorporate awareness of new IP-TV technologies, so that designers, technicians and developers are made aware of the above requirements.
In certain cases ITED means that the right of access to the infrastructure of the building is dependent on the prior approval of the condominium ¹⁷¹ or the existence of a customer who has already contracted the	The introduction of legislative amendments in order to confer the right of access on operators registered with ICP-ANACOM for the purposes of connecting their

¹⁶⁹ As far as SONAECOM is concerned, with the exception of the so-called "favoured area", no indication is given on the location of coaxial and data sockets inside rooms, with the result that, typically the coaxial sockets are in an area suited for TV and data sockets in opposite areas, as is normal in premises predating ITED. As a consequence of this situation, in the opinion of SONAECOM, the use of data sockets for IP-TV services is not suitable, leading to difficulties and intrusion when placing additional cables inside the customer's home.

¹⁷⁰ Similarly SONAECOM also considers that the size of the riser boxes should be adjusted to allow the housing of derivation equipment for the connection of multiple independent dwelling units on each floor of buildings.

¹⁷¹ Which, in the opinion of SONAECOM, may involve waiting for the annual meetings of the condominium owners.

service¹⁷².

networks to potential customers¹⁷³.

With regard to interaction with municipalities, SONAECOM believes that there are measures which need to be taken so that this does not become a choke point with respect to the development of NGA, namely:

- Exemption of municipal costs for access and use of local authority subsoil.

Insofar as the development of NGA is a national project which has received the commitment of the Government, SONAECOM argues that this should be a commitment that is assumed by all involved, especially by local government, which will benefit from the fact that all its residents will have access to NGA. In this context, SONAECOM proposes a system of exemptions, in respect of these charges, for the operators which invest in NGA in each municipality; At the same time it underlines the position of APRITEL, which has already been conveyed to ICP-ANACOM, with respect to MFRW¹⁷⁴.

- Simplification and harmonization of existing authorization procedures for interventions in municipalities.

For SONAECOM the longer a determined project takes, either as a result of technical difficulties or procedural problems, the greater its cost. Accordingly, SONAECOM takes the position that legislative intervention is essential to increase the flexibility of the processes, clarifying the system of prior notification to municipalities¹⁷⁵ and creating a system which ensures that uniform and harmonized rules are applied throughout national territory in all municipalities (in line with the general regime of development and construction).

Finally, SONAECOM identifies the issue of ownership and management of subsoil infrastructure installed by property developers upon the construction of new areas of urban development and which infrastructure is currently delivered to PTC. According to SONAECOM, this infrastructure is neither funded by or owned by PTC, and as a consequence it sees no justification, except for historical reasons, for delivery of such

¹⁷² Which, according to SONAECOM, calls into question the logic of constructing of these networks which, typically, are completed based on a strategy of selling the service subsequent to the network's construction, due to the high costs and and large amount of time associated with the installation of the vertical network when this is not done consecutively to the installation of the horizontal network.

¹⁷³ Naturally, according to SONAECOM, this does not mean that rights of condominium owners are not safeguarded insofar as their property is protected from being damaged or from interventions which risk the aesthetics and outlines of buildings (issues which must be safeguarded by guidelines which govern this type of intervention by operators).

¹⁷⁴ Arguing for an urgent review of the current system, whose application is not feasible on the ground, whereby the new Regulation needs to be clear that this fee may not overlap with any other connected to the use of local authority soil of subsoil for the installation of electronic communications infrastructure.

¹⁷⁵ For example, in the case of the removal of an obstruction under the RCAO, SONAECOM refers to PTC's position that, whenever the installation of fibre optic of an operator comes up against an obstacle in the conduits, clearance of the obstacle requires local authority authorization (which once again makes the costs associated with the project more burdensome).

infrastructure to PTC, or for PTC to charge for its use, where access is requested by third parties. SONAECOM takes the position that this practice represents, on the one hand, interference by PTC with respect to assets which do not belong to them, and on the other, an impediment to access by other operators on equal terms. In this context, SONAECOM argues that the regulator should promote a legislative amendment clarifying that such infrastructure should be delivered to an external entity which will manage it according to the public interest (including to the entity resulting from the functional separation of the PTC network).

VODAFONE considers that from a technical point of view there are several barriers which constitute serious impediments to the development and implementation of NGA, including: (i) access to PTC's conduits, irrespective of the topology (FTTCab or FTTH/B); (ii) access to the street cabinets and the possibility of sub-loop unbundling (FTTCab); and (iii) access to internal fibre optic networks in buildings and the extreme delays in obtaining agreements with condominiums (FTTH/B). To minimize the problems presented, VODAFONE refers to its proposals for access to space and buildings presented in its responses to questions 40 and 41.

Question 18: What type of regulatory intervention do you deem necessary and appropriate to ensure that such solutions are possible and are consistent with the objectives of regulation defined in national and community legislation?

According to the position taken by PT, existing horizontal and vertical barriers go beyond the scope of sector regulation (and are not attributable to the operator with SMP) and equally affect all operators, which from the outset face the same conditions with respect to the construction of NGA; these barriers should be resolved through consensus in a coordinated and symmetrical way.

However, PT believes that in the RAO other operators are provided with the conditions necessary for the installation of fibre optics in local access, whereby the question of its alignment with FTTCab and FTTH solutions should be addressed:

- The incorporation of FTTCab solutions into the RUO is, according to PT, a question above all of unbundling the copper sub-loop and its connection to the network of another operator – a question which, so far, has not been answered either by operators or by the regulator¹⁷⁶. Accordingly, access to the copper sub-loop should be, according to PT, subject to a detailed assessment of the interests of operators and of the conditions of access to the public domain.

¹⁷⁶ For example, sustainable business plans, installation of individual street cabinets or street cabinets shared by the operators or co-installation in street cabinets of PT, with larger dimensions and different from the existing cabinets or local authorities restrictions on the installation of new equipment in the public space.

- In the case of FTTH Solutions - the option which in PT's view has engaged the interest of operators and the support of manufacturers - the use of passive and shared (PON) architectures has relevance. In this context, PT considers that the unbundling of optic loops (access to the wavelength), is a measure which will be difficult to implement, since it is a solution which is technically complex and immature. For these reasons, and because it already guarantees access to conduits, PT maintains that it should not be obliged to offer unbundling solutions (including virtual¹⁷⁷) with respect to the optic loop.

According to ALCATEL-LUCENT, to ensure fair competition and encourage investment in FTTH services, flexible approaches are required, both to architecture and technology, as determined by the requirements of investment and given that the paradigm of optical fibre differs from the paradigm of copper. The sharing of conduits (horizontal) is, according to ALCATEL-LUCENT, a vital component in the reduction of the costs of constructing competitive network infrastructure (passive). The manufacturer believes that the solution of sharing passive infrastructure is adaptable to any country or region, with several options available for sharing (conduits, optic fibre and / or bitstream), which provide competition based on infrastructure and services.

FCCN considers that regulatory intervention should be particularly rigorous with respect to the various elements of shared physical infrastructure. Accordingly, FCCN believes that a review of ITED is a priority, not excluding the need to adapt the law of condominiums, to prevent situations of operators having exclusive access to services provided to a condominium.

The CEGEA comments that the most appropriate regulatory response might be the implementation of a solution of functional separation of the incumbent operator's network. It recognises, however, that this is an extreme solution, whereby its feasibility in the Portuguese context should receive proper analysis.

COLT considers that the most urgent measures are (i) to identify what has already been done by PTC in its network and (ii) require PTC to provide clear and specific information on the ongoing evolution and on the technology which it intends to use. It further argues that any work be suspended in order to mitigate any action which could head off any regulatory action.

ONI maintains¹⁷⁸ that NGA installed by undertakings with market dominance should be open to the remaining operators. It therefore advocates the imposition of obligations to ensure the

¹⁷⁷ In this respect, PT notes that CMT considered that operators (which made a firm commitment to invest in NGA) could emulate the unbundling of the optic loop through a virtual FTTH offer from Telefonica, since there is no conduit offer in Spain (such as the RCAO in Portugal).

¹⁷⁸ Notwithstanding the argument that the development, installation and management of NGA should be performed by an entity which subsequently makes this network available to interested operators according to conditions of open access.

unbundling of the resources providing access to the end-customer and appropriate conditions of co-installation at aggregation points and access to these points.

ZON takes the position that, ICP-ANACOM's intervention with respect to NGA should be guided by the objectives of regulation set out in article 8 of the Framework Directive and article 5 of the LCE, and be consistent with the future European Commission Recommendation on NGA, whereby it should act in order to:

- ensure that there are no distortions or barriers to competition in the sector, while encouraging efficient investment in infrastructure¹⁷⁹;
- ensure appropriate conditions so that regulation may developed in a stable, predictable and transparent manner and be based on the principle of non-discrimination of operators and the promotion of efficient investment; and
- follow the principle of technological neutrality, whereby it should not opt to favour a particular technology over another in its intervention¹⁸⁰.

Regarding investment in NGA, ZON notes that the majority of such investment result from the cost of civil construction works (which in the case of FTTH/B the operator estimates as amounting to 70% of the network's total cost), taking the position that it is fundamental that the regulator seeks to avoid duplication of investments in the establishment of different infrastructure by the various operators, for which purpose regulatory measures are required favouring the sharing of infrastructure and resources.

Accordingly, ZON proposes legislative intervention to amend article 26 of the LEC, which establishes the right and access of alternative operators to conduits, poles and other facilities of the concessionaire, requiring a reworking of RCAO in order to accommodate obligations of transparency and non discrimination which are identical to those of other regulated offers, as well as making PT itself subject to this offer, including through functional separation. Furthermore, in relation to the sharing of resources, ZON suggests that ICP-ANACOM should encourage the sharing of installations in telecom risers (with optical distribution frames at the entry to the building) with associated benefits for operators and condominiums.

Another relevant issue which, according to ZON, calls for regulator's intervention is the provision of clear rules on the transition from the copper network to NGA, requiring a degree of flexibility and freedom for operators, according to their strategy, in order to decide on the

¹⁷⁹ Notwithstanding the importance of encouraging efficient investment to promote innovation, the focus of regulatory intervention should, according to ZON, be to ensure the absence of distortions to competition.

¹⁸⁰ According to ZON, the selection of the technology to be implemented is a decision of the operator, whereas it falls to the regulator to ensure strong, stable and predictable regulation enabling appropriate investment in NGA, giving operators the necessary freedom to opt for the technological solutions which they consider most suitable. However, it recognises that the different technical solutions to be adopted in the implementation of NGA may have an impact on regulated products (e.g., point-to-multipoint solutions have more constraints with regard to the unbundling).

appropriate time for ceasing to use the regulated offers. ZON takes the view that the specific terms of this transition should be dictated by market forces and by the evolution in demand.

ZON acknowledges that the simultaneous management of two networks with different architectures may cause problems for PTC. However, ZON believes that the interests of alternative operators and consumers justify the establishment by ICP-ANACOM of a transitional period according to flexible terms and allowing the maintenance of the LLU-based offers of alternative operators or ultimately, their recovery by PTC as a result of migration to NGA.

Finally, ZON draws attention to the issue of access to buildings, where horizontal property law (particularly the need to obtain authorization from condominium owners to enter the building) constitutes a practical barrier to the development of NGA which can only be overcome through legislative action, and therefore proposes an amendment to the procedural rules for convening meetings of condominium owners and on the adoption of resolutions at such meetings.¹⁸¹

SONAECON responded to this question in conjunction with the previous question.

Considering the supported bandwidth and return over the long term, VODAFONE considers that the regulatory framework for the implementation of NGA should promote FTTH/B solutions over FTTCab solutions, with the former better providing for the preservation of competition.

The proposal presented by VODAFONE to promote the creation of a single network which will see participation not only by the operators but also local authorities and providers of services (power, transport etc.) would enable the combination of infrastructure and rights of way allowing the development of an access network with sufficient capillarity up to the buildings or homes of the customer. According to VODAFONE, with the lack of such a single, national network, regulatory and political intervention will be needed to address (i) the conditions of access to all types of infrastructure necessary for the implementation of NGA, (ii) wholesale offers providing access to the entire NGA, and (iii) access to buildings and more flexibility with respect to the conditions governing the obtainment of agreement of condominiums for the implementation of fibre up to the homes of customers.

In a restrictive scenario in which NGA is owned by PT and in which PT is unique in being able to develop conditions of access, VODAFONE believes that the constraints and procedural barriers currently observed with respect to the wholesale RUO, RAPT and RAO offers will be expanded, as a result of the technology and different network topologies which may be adopted and as a result of the increased difficulty in finding technical solutions which can serve to support regulatory requirements. According to VODAFONE, in this scenario¹⁸²

¹⁸¹ See details in the response to question 40.

¹⁸² Which it considers to be the worst scenario for the implementation of NGA in Portugal.

and in addition to measures for the creation of conditions permitting the installation of the equipment of alternative operators, the unbundling of fibre optic loops and access to conduits and buildings, regulatory intervention should be extended to the establishment of wholesale offers which enable the retail offers of PT to be replicated in terms of competitiveness and profitability, while enabling differentiation in terms of content and price.

In conclusion and considering the technology-neutral nature of the regulatory framework, VODAFONE sees no reason why the current wholesale offers cannot be updated and adjusted to a new reality of services supported by fibre optics over NGA.

Question 19: Under what circumstances do you consider that there are grounds for the imposition of obligations with respect to the unbundling of fibre optic in its various forms (e.g. the entire fibre, the wavelength, etc.).

PT advocates the abandonment of a regulatory framework which it alleges is overly intrusive and largely directed at competition between services and which, by not rewarding risk, discourages investment and allows other operators to base their offers on PT's infrastructure. Instead, given that the competing operators have the effective capacity to invest in NGA, PT sees no reason to fear a monopoly or even a duopoly, considering that the conditions exist for the adoption of a stable regulatory framework which gives equal treatment to all operators wishing to invest in NGA. According to the position taken by PT, such timely investment, which should be promote regulation, depends, among other things, on the predictability and certainty of regulation and a rate of return which is sufficient to encourage private investors to assume the risks of operation.

PT believes that it is not necessary to impose asymmetric obligations, because:

- contrary to the situation which occurred with respect to the historic network, all operators are subject to the same circumstances at the outset and any barriers to investment in infrastructure will be equal for all operators;
- there is a wholesale offer of access to conduits;
- there is multi-platform or infrastructure based competition, in particular with the cable network "*and now, with NGA belonging to Sonaecom*"; and
- taking into account the positions of ZON and SONAECOM in the market, and the capability of both companies to invest in NGA, it would constitute unjustified discrimination against PT.

In the discussion on the unbundling of the optical loop, PT believes that it must be taken into account that NGA involves an architecture and technologies which are different from those currently used, and that access to fibre optics can have different configurations from point-to-point solutions (copper network), in which optic fibre is shared by several users. Indeed, in the same way as the mechanisms of unbundling the copper pair cannot be directly adopted

for cable networks, PTC says that mechanisms of unbundling the copper pair do not apply in the context of the NGA.

PT therefore considers that in no circumstances are there grounds for the imposition of obligations with respect to the unbundling of fibre optics in its different forms, which, otherwise would be a definite sign that conditions for investment in NGA do not exist.

FCCN considers that there is a need to impose obligations on the unbundling of fibre optic over the entire optic fibre. With respect to the unbundling of fibre optic by wavelength, FCCN states that this may occur in parallel, but believes that the additional complexity and limitations in terms of innovation in transmission techniques, makes this less of a priority.

CEGEA cites the position of the ERG in which it is advocated that the unbundling of fibre optics should be encouraged whenever possible. CEGEA makes a distinction between the unbundling of point-to-point connections - which it considers to be without major difficulties¹⁸³ - and point-to-multipoint - technically and economically far more complex, whereby the benefits of unbundling should be weighed (in competitive terms) against the costs (for example, with unbundling by wavelength). In the latter case, CEGEA argues that consideration should be given to the creation or imposition of the kind of wholesale bitstream products which, while not imposing the need for physical unbundling, allows other operators to provide services which they plan to offer in the event that unbundling of the fibre optic is not possible.

Depending on the technical solution adopted, ONI believes that consideration could be given to the unbundling of the optic fibre or the wavelengths. In the event that a network operator model is adopted, ONI believes that these obligations should be imposed with respect to unbundling on any other operator which develops a network on its own initiative to provide infrastructure in areas of reasonable coverage with the exception, on a case-by-case basis of links to individual customers. In the case of a model of infrastructure-based competition, ONI considers that unbundling obligations should be imposed on undertakings with dominance in the broadband markets.

According to ONI, consideration should also be given to the possibility of imposing *ex-ante* obligations which guarantee the implementation of network topologies which facilitate unbundling.

ZON states that it does not have enough information to respond this question.

SONAECOM considers that the conditions necessary for the imposition of this remedy are the same as those which today justify the unbundling of the local loop based on metallic pairs. SONAECOM cites support in the document "ERG Opinion on Regulatory Principles of NGA", which states that the unbundling of fibre is possible in both a PON architecture and in a point-to-point architecture, with the point varying at which access can occur without

¹⁸³ Referring that it is quite similar to the way in which local loop unbundling functions today.

involving the aggregation of additional network elements. Therefore, according to SONAECOM, the difference lies in the investment which needs to be made in the network itself so that it reaches the point of unbundling, which, in a PON scenario, is greater.

With respect to the proportionality of such an imposition, SONAECOM believes that consideration should be given to the fact that in many accesses the alternative may be the existence of a monopoly in these areas, insofar as the original MDFs may have been discontinued, or even where they remain, the capability of offering competitive services in relation to those based on the fibre optic network will be somewhat diminished.

Additionally, it should not be forgotten that the other option (of alternative operators constructing their own networks), in addition to not being feasible in all areas, may give rise to operational problems related to availability of space in the conduits or problems related to local authority rules for intervention in the soil and subsoil (e.g., grace periods of 5 years following intervention). Furthermore, from the point of view of quality of life of residents and the environmental impact of NGA construction, SONAECOM considers it appropriate that network sharing should be promoted, given the undeniable economies of scale and negative impact which such construction has on these variables.

SONAECOM's proposal is to implement the functional separation of PTC's network (as occurred in the case of *Openreach*), or a solution that has an equivalent effect (creation of an autonomous entity that is responsible for managing access to determined essential resources, such as conduits or last mile fibre). In this scenario, SONAECOM considers that the viability of a solution which is in harmony with the solutions of different operators is guaranteed, insofar as it ensures the incentives necessary for establishing an offer which is aligned with their needs.

The technical possibility of fibre optic unbundling is, according to VODAFONE, dependent on the NGA topology chosen by the holder of the network or on the incentive given by regulators to implement this topology. VODAFONE adds that interest in unbundling depends on the regulatory conditions established to encourage investment by competitors on the second rung of the investment ladder.

According to VODAFONE, FTTH topology, where:

- Point-to-multipoint (GPON), has limitations in terms of space which are resolvable if co-installation is executed at the level of the splitter, which, even so, makes unbundling technically complex.

- Point-to-point, presents significant limitations in terms of costs of implementing the network which, in a scenario of unbundling, would be reflected in the prices which alternative operators would have to pay for access¹⁸⁴.

VODAFONE comments that the trend across Europe suggests that incumbent operators tend to opt for FTTCab or point-to-multipoint topology, which have drawbacks in supporting the unbundling of fibre, noting with concern "*the disinterest shown by the authorities with respect to these projects, which in the medium term, will result in the dominance of the incumbent operators being strengthened as a result of a new market distortion which eliminates competition*".

Position of ICP-ANACOM

Some of the operators and most of the other entities considered the implementation of FTTCab solutions to be both possible and viable, particularly in urban areas of greater density and in street cabinets with greater capacity, depending on a detailed, case-by-case analysis of the technological options and the technical, economic and legal conditions (e.g., municipal licences for the installation of cabinets and any infrastructure). However, certain effective technical and economic constraints were cited from the outset (e.g., the cost of widespread installation or replacement of street cabinets and the use of VDSL2, with technical restrictions in certain circumstances). In this context, note is made of the proposal of CEGEA for the preparation of "*an accurate and updated register of PTC's access network*", an issue which is not examined, *per se* in this document.

On the other hand, other operators do not consider an FTTCab solution to be a desirable solution, arguing that this would not provide for conditions which would enable the existence of competition in the fixed broadband market, citing preference instead for an FTTH type of solution, while the same operators added that it is precisely in the urban centres of greater density that FTTH solutions are considered to have most viability.

In any case, even though reference is made to a number of constraints, the majority of respondents do not immediately dismiss the FTTCab option, which may be feasible in certain situations. If the analysis of the economic viability of this solution lies with the operators, constrained mainly by the level of investment in street cabinets (and the extension of fibre optics to these cabinets¹⁸⁵), it falls to ICP-ANACOM to minimize any regulatory and procedural constraints that may exist with this option.

Any move towards an FTTCab solution, even in a limited way, will always be associated with the development of LLU (as opposed to an FTTH solution, independent of the copper network), especially with the conditions of local sub-loop unbundling and co-installation in, or

¹⁸⁴ According to VODAFONE, this scenario presents a topology in which the length of the fiber optic loop and the small number of aggregation points provides for economic and profitability analyses which are close to those obtained with the LLU, although in terms of the final price of retail offers, limiting the expansion of offers.

¹⁸⁵ Although the extension of optical fiber can always be used for a long term solution, of the type FTTH.

next to, the street cabinets. Accordingly, if PTC moves towards an FTTCab solution and any of the operators benefiting from LLU show a firm intention to benefit from the same solution, ICP-ANACOM will examine the situation in detail and may need to intervene with respect to the RUO, especially in terms of processes and procedures (including co-installation). To this purpose it is noted that the RUO already provides for the possibility of local sub-loop unbundling, although this solution requires more detail and operation.

Various entities advocate the sharing of street cabinets, with the aim of reducing the costs of an FTTCab solution. To the contrary, PT does not consider such a solution to be possible, in practice¹⁸⁶, due both to its complexity and the costs of development, and due to local authority restrictions on the size of (large) new street cabinets.

ICP-ANACOM considers that, given the current technical constraints (e.g. existing street cabinets unsuitable for FTTCab) and procedural constraints which affect the two possible solutions (sharing, requiring larger cabinets, or the installation of individual cabinets, in greater number), the implementation of these solutions involve significant challenges and complexities, and will always become even more constrained as they evolve.

Moreover, it may be that no single solution exists, i.e., in certain situations it may not make sense to have individual cabinets, and in others, the opposite may apply:

- in areas currently served by very small cabinets (connecting a small number of loops), it makes no sense to have operators install their own cabinets;
- in certain areas, such as historic areas, the installation of a large cabinet (for sharing) is not, in principle, achievable¹⁸⁷, as it may also not be possible to install multiple (individual) cabinets;
- there are municipal councils with different rules and, in some cases, rules which are somewhat restrictive.

However, as mentioned above, and as PT acknowledges, stating that its "*FTTCab solution is embodied by micro-coverage with ADSL technology in street cabinets*", there may be parties interested in an FTTCab solution. In this circumstance, where PT actually intends to install new street cabinets or APs¹⁸⁸ (or adapt existing ones), this Authority takes the preliminary position that PT should send to the beneficiary operators of the RUO, with reasonable notice, the information relevant to the assessment of economic viability, such as the location of the AP or street cabinet, the number of loops to be relocated and their numbering and area of coverage. Where these operators express a firm intention to move towards a similar solution, PT must take the interest expressed into account.

¹⁸⁶ As well as CEGEA, which considers that individual use may make sense from a competitive point of view.

¹⁸⁷ Unless the very high costs (e.g., with the placement of the cabinet in the ground, if possible, and using a lift to access it).

¹⁸⁸ Regardless of whether ADSL or VDSL2 solutions are being used, it is important that the cabinet is already prepared for DSLAM, its powering, fibre optic input, etc..

It is noted that in this situation, where PTC may need to develop and invest in new solutions, it is not enough that operators simply express their general interest in an FTTCab solution or in co-installation at AP level. It is necessary that they make an effective commitment to co-installation at street cabinet level, supporting any additional costs associated with this demand.

Most of the entities consider that development of NGA in areas of lower population density and/or more remote areas is not feasible due to the high level of investment involved.

ICP-ANACOM acknowledged in the consultation document that it is more likely that FTTH/B solutions will be used primarily, in the first phase, for new projects and, crucially, that they will be installed in densely populated areas or areas with high ARPU potential (in buildings rather than individual houses), with operators seeking to gain scale associated with the extension of optical infrastructure, thereby obtaining a higher and faster return on their investments.

However, it is incumbent upon ICP-ANACOM to (i) seek development of the market in a balanced way, including the promotion of competition at the level of infrastructure and access to networks and services also in less developed areas and (ii) to seek to ensure non-discrimination in the provision of products and services at both wholesale and retail level, reducing the barriers between the info-included and the info-excluded (citizens living in remote areas who will not have easy access to services provided using NGA) and promoting social cohesion.

In this context and taking into account, as cited by ZON, "*the strategic interest of NGA [and the services supported on it] with respect to Portugal's development*" as a coercive whole, it is desirable that the development of a fibre optic network has national coverage.

It therefore appears necessary to reduce, as far as possible, any constraints on the evolution of NGA, including the promotion of solutions for the sharing of physical infrastructure – encompassing access to poles and buildings, which could be key in the extension of fibre optic to the most remote areas, where there is little or no underground infrastructure. This is regardless of their "ownership" (operators or other entities, including public entities). These issues will be developed further later in this document. These issues will be developed further later in this document, particularly in sections 2.2.11 and 2.2.12.

As mentioned in the consultation document, consideration must still be given to projects, of a public nature, for the development of alternative networks in various regions of the country, with the primary objective of providing broadband services in areas currently not covered by traditional operators¹⁸⁹. The expansion of "community" projects of this type, possibly with public incentive¹⁹⁰, may give leverage to the offer of optical infrastructure in these areas.

¹⁸⁹ See references in the consultation document, in section 6.1.

¹⁹⁰ E.g., through direct public investment (including local authorities, as already exists), public-private partnerships (PPP) or subsidies (e.g. for future users of services).

With incentives from the State or public investment, it should be ensured that these are suitable for the development of the market and do not distort competition. Assuming that this incentive or investment results in infrastructure of shared access, such access, for the provision of retail services, should be provided in an open, transparent and non-discriminatory way, in line with the guidelines and administrative practice of the Commission for the assessment of state aid and in compliance with the provisions of the previously cited Protocol between the Government and the operators concerned. See also in this respect, section 6.1 of the consultation document.

Various issues are raised by the different entities, related mostly to the so-called "horizontal barriers" and "vertical barriers" to the development of FTTx solutions. Indeed, it appears that there are major concerns about the potential limitations on access to passive infrastructure (space in underground conduits and inside buildings) as well as procedural and legal issues (e.g., with respect to local authority licensing, which some entities consider restrictive or protracted)¹⁹¹.

It is the position of ICP-ANACOM that some of these limitations can be minimized or even eliminated with simultaneous intervention at a regulatory and legal/procedural level.

Indeed, in terms of "horizontal barriers", mainly with respect to access to conduits (less priority seems to be given to access to street cabinets, for the reasons highlighted above), there may be intervention at two levels, promoting:

- A comprehensive sharing of infrastructure, ensuring reasonable conditions of access to the conduits belonging to PT and to third parties (utilities or companies such as REN, EDP, EPAL or Estradas de Portugal, or public entities such as local authorities). Access should also be provided to other infrastructure such as poles¹⁹² or space in buildings (e.g. exchanges, in the case of PT).
- The development of a national database for the registration of all the infrastructure, especially passive infrastructure (conduits, poles, buildings, etc..) that can support electronic communications networks, enabling all operators to make more informed decisions about future investment and optimise network planning.

It is noted that, especially in conjunction, these measures could facilitate a more rapid and geographically expansive development of NGA, minimizing the need for investment in the construction of new infrastructure. When feasible, ICP-ANACOM considers that even in these cases, it would be desirable if there was coordination and sharing of construction

¹⁹¹ In this context, reference is made to a series of constraints related to: access to infrastructure, civil construction (a major cost component of NGA, especially where there is passive infrastructure on the ground): the cost of municipal fees for access to and use of subsoil: the ownership and management of underground infrastructure in new areas of urban development: the absence of a register of infrastructure and possibility of sub-loop unbundling; receiving permissions from condominiums; and the lack of technical space for the installation of CPE.

¹⁹² They may be key in the extension of fibre optic to the most remote areas, where no or few conduits may exist.

costs, where such costs apply, rather than there being one entity interested in providing its services in the area concerned, This would be beneficial in terms of competition and economic efficiency and ultimately positive for the consumer.

In terms of "vertical barriers", consisting mainly of access to the telecom risers inside buildings (or, in older buildings, access by other means) for the extension of fibre optic to the customers' home, it is possible and desirable to intervene at two levels:

- In terms of ITED (and the new ITUR system), seeking adaptation to new realities, i.e., the evolution to NGA (fibre optic to the home of the customer and inside the home¹⁹³), as well as to the vast majority of situations, i.e., less recent buildings ("pre-ITED Manual"), which may need to undergo changes, because they will not generally be suited to supporting fibre optic infrastructure. This subject is discussed in more detail in a later section.
- In terms of the horizontal property regime, i.e., the relationship between the condominiums and the network operators which want to offer their services in these buildings. This subject is discussed in more detail in a later section, but for now it is recognized that it would be desirable to intervene to facilitate the installation of optical infrastructure inside buildings as well as the sharing of such infrastructure by other operators. One possible measure would be the possibility of a reserved space, if available (e.g. in the basements) for the installation of equipment (e.g. DSLAM¹⁹⁴, ODF, splitters, etc.), creating a point of flexibility which facilitates the access of various operators to the optical fibre infrastructure installed inside the buildings.

The intervention of ICP-ANACOM is centred on regulation. The cited allegations of protraction, complexity or lack of harmonization in local authority licensing procedures for the installation of resources on the public highway or issues related to the costs of access to and use of local authority subsoil, are duly noted and have been and will be the object of consideration according to this Authority's role of advising the Government, particularly in the execution of the mandate conferred by the already cited Resolution of the Council of Ministers.

ICP-ANACOM recognizes that some of the measures taken to reduce the barriers to the development of NGA, such as the sharing of infrastructure (e.g. conduits), will require, beyond regulatory imposition, the coordinated and constructive participation of all stakeholders including the Local and Regional Administrative Authorities, operators and other entities such as concessionaires and/or utilities.

In this context, it is recognized that there is a need for a new regulatory approach, even while based on already enshrined principles, which have led, for example, to the imposition

¹⁹³ Reference is also made to the possibility of installing coaxial cable and data (Ethernet) internally, allowing services to be provided in any room.

¹⁹⁴ And their powering, where active equipment is installed.

of the RCAO. In the past (and even at present) the copper access network was considered an asset that could not be replicated, whereby there was imposition of access to third parties, i.e., the sharing of copper through the unbundling of the local loop. However, there appears to be agreement that, in the evolution towards NGA, it is possible and preferable that more than one operator invest in the development of fibre optic networks, thereby improving competition in the infrastructure¹⁹⁵, without this implying the construction of passive overlapping infrastructure, with high costs and reduced efficiency (e.g., conduits and associated infrastructure).

From the outset, optical fibre cables may be considered as assets (economically) which are replicable, provided that the basic technical conditions exist for their development by any operator, as provided for through access to passive infrastructure (including conduits) according to rules and principles which ensure a "level playing field".

In this context, where there is a need to construct access to new urban developments or where there is lack of space or even a lack of infrastructure in existing urban developments, in the interests of efficiency, development of joint projects must be promoted, with costs shared between the interested parties. The European Commission also addresses this issue in the proposed recommendation, noting that the regulators should facilitate and encourage the sharing of projects between SMP operators and other alternative providers at the time of new investments to replace or establish cables, conduits and other infrastructures which has been installed or which is due to be installed¹⁹⁶.

ICP-ANACOM has proposed measures to the Government to put such sharing into practice, in particular for projects of utilities or public entities, and plans to create an integrated approach which makes the most of existing synergies, encouraging efficient investment and reducing the level of initial investment needed to implement infrastructure for the rapid and extensive, but sustainable, development of NGA.

Additionally, ICP-ANACOM considers it desirable for there to be yet wider availability of passive infrastructure, including spaces and conduits of other entities, which is accessible to operators.

However, ICP-ANACOM may not, according to the current framework, impose any obligations of this nature - *ex-ante* and symmetrical - whereby there is a need to establish a comprehensive legal framework which is predictable and transparent and based on the principle of non discrimination and the promotion of efficient investment, consistent with the current regulatory framework and also with the future European Commission Recommendation on NGA. To this end, ICP-ANACOM has already presented the

¹⁹⁵ Moreover, the European Commission itself states, in the draft Recommendation, that "*the existing regulatory framework places emphasis on the role of network infrastructure competition*". See para 7, page 4.

¹⁹⁶ para 11, page 6: "*NRAs should facilitate and encourage build-and-share projects between SMP operators and other alternative providers at the time of new investments to replace or establish cables, ducts and other facilities*".

Government with a raft of measures to ensure appropriate conditions, in order that the market, and particular NGA, can develop in a consistent and sustainable way.

Meanwhile, in a scenario of (mass) implementation of FTTH solutions, this Authority considers that it should act in order to facilitate cooperation with respect to the installation and sharing of infrastructure inside buildings. This action will enable an increase in the choice of service providers available to the end-user and will avoid inefficient duplication of infrastructure; a topic which is already covered in the legislative proposal sent to the Government.

The same proposal by the European Commission also proposes that there is some symmetry in the sharing of infrastructure for access to buildings, stating that where operators deploy FTTH, NRAs should facilitate cooperation regarding the roll-out and sharing of ("vertical") NGA infrastructure within buildings in order to enable end-users to have competitive choice.¹⁹⁷ That is in pursuit of the objectives of promoting competition and protecting the interests of consumers, particularly to enable their access to a wide range of offers of services and providers.

Accordingly, ICP-ANACOM has already taken action in its role of providing assistance to the Government, with respect to "vertical barriers" and especially ITED, without prejudice to the work that is presently under development with respect to the rigorous adaptation of this scheme (e.g., ITED manual) to meet challenges that lie ahead, through the need to provide for: (i) the possible sharing of "vertical" infrastructure (space¹⁹⁸ and access to telecom risers), (ii) changing the paradigm, with the installation of fibre optic up to and inside the home, and (iii) the adaptation of older buildings.

As regards relations between the condominiums and operators who want to install network equipment in buildings, this is a matter which is also outside ICP-ANACOM's direct remit. However, because this is an issue which has caused concern for many of the operators, it was included in the legislative proposals submitted to the Government, with the goal, on the one hand, of streamlining this relationship and making it easier and quicker for operators to gain access to space in buildings and, on the other, of ensuring that condominiums get the benefit of being able to access services with minimum cost and impact.

As provided for in the current regulatory framework, obligations of wholesale access may be imposed on entities with SMP in a given market, allowing competing operators to access an offer which is sufficiently disaggregated under appropriate conditions (e.g. by means of co-installation, at access points). In pursuit of the principle of technological neutrality, ICP-ANACOM considers from the outset that this situation is unchanged with evolution to NGA.

¹⁹⁷ Para 13, page 6: "*Where operators deploy FTTH, NRAs should facilitate cooperation regarding the roll-out and sharing of NGA infrastructure within buildings in order to enable end-users to have competitive choice.*".

¹⁹⁸ For example for the installation of optical distribution frames at the entrance of the building (or even active equipment such as DSLAMs).

Other issues raised in this section by the entities that responded to the public consultation, and any changes to the current wholesale access offers, the existence of a single network, functional separation or specific aspects related to the transition to NGA, are dealt with in more detail in the relevant sections.

In this respect, it is stated that while PT argues that it is not necessary to impose asymmetric obligations of access, considering that conditions are now in place whereby competing operators are also able to invest in NGA and identifying technical constraints with respect to the unbundling of fibre optic due to its sharing (in point-to-multipoint solutions), most of the other entities considered that it was possible and even desirable to provide for this obligation, even though these operators also recognise the complexity involved in the unbundling of fibre optic at wavelength level (in point-to-multipoint solutions).

ICP-ANACOM acknowledges the possible technical complexity of a solution which involves the unbundling of fibre optic, especially in cases where the topology adopted by the dominant network operator is point-to-multipoint, which would imply "co-installation" at the level of the last splitter, a complex solution with increased costs for all involved, especially given the large number of access points. However, this is a solution which would not differ substantially from the one which would be adopted in the case of FTTCab networks with the unbundling of the local sub-loop (in copper)¹⁹⁹, also a more complex and higher cost solution in terms of unbundling (for all concerned) compared to loop unbundling at exchange level, which means that no solution can be dismissed from the outset.

Meanwhile, as already noted above, an obligation of access has been imposed *ex-ante* through the unbundling of the local loop, on the operator with dominant position in the wholesale access market, also in order to promote greater investment in network infrastructure by operators insofar as these operators begin to (co-)install in the exchanges of PT, closer to their customers. However it is important to note that, when this obligation was imposed, competing operators could not, in practice, access PT's conduits.

Moreover, as PT recalls, currently "*there is a wholesale offer of access to conduits*", which offer may allow alternative operators, including cable operators and others, to develop their own networks (for NGA) independently, seeking ever greater independence from PT's network and other wholesale offers.

Therefore, from the outset, it is considered that the existence of conditions which are non-discriminatory and transparent with cost orientation at the level of access to PT's passive infrastructure (including conduits) may accomplish - for all stakeholders, including the regulator - the goal of achieving equal opportunity in terms of investment in and development of NGA networks.

¹⁹⁹ Similar with respect to the high number of access points (with co-installation) and the greater extension of the distribution network (*backhaul* up to these access points).

In a scenario where access to passive infrastructure is guaranteed according to these terms, it is not expected from the outset that an obligation of fibre unbundling will be imposed in a general way, especially in areas where socio-economic conditions allow competition in terms of network infrastructure and, of course, retail offers. Naturally, in the event that there is a decline in the level of competition in the market or there occurs a new situation of dominance at the level of installed optic infrastructure, this situation will be examined as part of ICP-ANACOM's regular supervision of the market, particularly as part of the future analyses of (access) markets.

2.2.7 The transition to NGA - (two) networks in parallel and network access

Question 20: Do you consider that it is necessary, from a technical and functional point of view, that, in a given geographical area, the current PSTN/ADSL network (from the exchange) and FTTx solutions (VDSL or fibre optic) should operate in parallel? If you consider that it is necessary, for how long and under what conditions?

PT considers that in some areas there may be a need to maintain both types of network in operation for some time, while in other areas migration to NGA will coincide with the discontinuation of the existing network, depending on the extent to which customers sign up to the services (new and current) and on the evolution of different technological solutions. PT takes the position that, in any case, it should not be obliged to keep a discontinued network in operation once a determined period of notice, to be defined, has elapsed.

According to ERICSSON terms and conditions must be defined in accordance with the development of services and commercial considerations, and also to safeguard any obligations which are binding upon PTC.

COLT considers that there should be no temporary solutions before long term and definitive evolution takes place.

ONI supports operation in parallel where this is necessary to support the services of co-installed operators. According to ONI, the period should be determined by the business plans of these operators, and the conditions of the RUO should be maintained throughout this period. According to ONI, PTC should support any increases in its operating costs.

According to ZON, it is necessary to maintain the current network in operation in some geographical areas to enable the migration of services provided to customers and ensure that there is no interruption of service²⁰⁰.

²⁰⁰ ZON draws attention to the fact that not maintaining the PSTN / ADSL network in parallel would entail "extraordinary investment costs" for co-installed operators and it refers to the situation in Netherlands where KPN assumed the additional costs arising from NGA and the discontinuation of the traditional network.

SONAECOM takes the view that this co-existence is essential due to the need to ensure a return on the investments made by alternative operators in the exchanges of PTC. Additionally, SONAECOM argues that the timing of the cancellation of the "original loops" should be subject to the existence of a wholesale offer which supports equivalent services based on NGA, as recommended by the ERG²⁰¹.

VODAFONE takes the view that it is necessary to ensure that this transition does not constitute a rupture either for the undertakings which have invested in the market for the provision of fixed broadband services or for the customers benefiting from such provision, which, were this to happen, would have negative implications for competition. For this reason, the operator advocates that it is of great importance to maintain PSTN / ADSL and FTTx solutions in parallel for a period of time to be determined²⁰², in a given area. According to VODAFONE, it is preferable that the implementation and careful timing of the transition should be closely coordinated between PT and the beneficiaries, possibly with the involvement of ICP-ANACOM.

Question 21: Do you consider that the conditions exist in Portugal for the development of competing NGA? With that level of geographic coverage?

According to PT, the recent announcements by two operators demonstrate an interest and willingness to invest in new solutions, with several operators embarking from the same point, facing risks which are in proportion to their investment strategies and planned approach to the market, whereby there is no fundamental limit on the development of plans to invest in NGA.

With respect to the degree of coverage, PT judges that at this stage, NGA will develop progressively, from the most profitable areas of the major urban centres, expanding progressively (and slowly) to other areas²⁰³. In this context, in different geographical areas, PT does not consider it likely that any one operator will come to hold a position of dominance²⁰⁴.

CEGEA believes that from a perspective of social well-being, the construction of competing NGA may not be desirable. In this regard it indicates that the costs associated with the

²⁰¹ "(...) Before the current access network is replaced by the NGA, it should be clear whether all the regulated services can continue to be delivered in the NGA. If this is not the case (e.g. phasing-out of MDF-access), an equivalent alternative should be determined. After all, regulation of this service is found to be needed to address competition problems in a market analysis decision. This equivalent alternative should be developed and implemented. After it is possible to actually buy the equivalent alternative, phase-out of the (old) regulated service should be allowed. The allowance of phase-out is most probably joined by conditions with regard to e.g. a reasonable phase-out period (...)"

²⁰² Which it estimates should not be less than 5 years.

²⁰³ In this respect PT refers to its response to question 4.

²⁰⁴ PT refers in this regard to the similar position taken by OFCOM ("Future broadband, Policy approach to next generation Access", September 2007).

replication of competing networks may be much higher than the competitive benefits that could be derived. CEGEA indicates, however, that the technological developments associated with the cable network will, in a short time, enable it to compete with NGA based on the fixed network in terms of products offered²⁰⁵. In this respect, it concludes that, even while the cable network does not have the comprehensive geographical coverage of the fixed network, there will be competition between NGA, especially between the NGA based on the fixed network and NGA based on the cable network.

In view of COLT, in some geographical areas with higher population density (almost the entire coastline) there may be competing NGA. However, it considers that, in economic terms, it would be more beneficial if there was only one NGA with a system of equal access for all operators.

According to ONI, the installation of competing networks can be expected only in residential areas of high density or high income or in industrial and business estates. However, it takes the view that the real differentiation between operators is evident at the level of services and not the access networks, whereby it argues that the replication of access networks in all equivalents would be economically inefficient. Accordingly, ONI supports the installation of NGA by a body specifically constituted for this purpose with access to the installed network provided to all interested parties.

ZON argues that the most appropriate model for the development of the NGA in Portugal may be the creation of a single network, since this supports the interest of developing a strategic asset for the country (contributing to the accomplishment of the strategic goal set by the Portuguese government that, in 2010, one million customers have access to NGA) and the need to limit the importation of equipment and material.

ZON also cites the two following additional advantages of this model:

- It allows operators to maximize their investments and focus on the development and deployment of innovative services and the creation of value for society with direct benefits for consumers.
- It allows greater development of national coverage, reducing info-exclusion.

According to ZON, the current context for the development of NGA in Portugal requires that operators have access to the conduit infrastructure of the incumbent operator, which is limited by the privileged access which this operator possesses. Accordingly, ZON argues that it is essential to ensure the structural separation of PT's wholesale business, creating a new entity which is legally separate and responsible for the management of essential infrastructure so as to ensure that access is provided to this infrastructure according to transparent conditions for all operators, including PT itself. According to ZON, this is the only way of creating a "level playing field" in the market, ending PT's competitive advantage

²⁰⁵ Referring to the responses given to questions 4 and 5.

of access to this essential asset which not gives it the possibility of being the "first mover", but which also gives it access to the plans of its competitors.

SONAECOM²⁰⁶ believes that there are parts of the national territory with conditions which allow the development of competing offers, particularly in areas with the characteristics identified in its response to question 16. According to this entity, viability of the business will depend on the interaction of several factors, which require a detailed study: (i) the number of existing alternative networks, (ii) the socio-economic characteristics of the population, (iii) whether or not there are available conduits, (iv) demographic concentration, (v) the level of vertical construction, etc.

Given the general characteristics of the country, SONAECOM considers that it is essential to have appropriate regulation of bottleneck infrastructure (at a minimum conduits, especially in terms of the last mile, fibre-optic loop and copper loop). Accordingly, SONAECOM considers that it is better to move towards a context of regulation which is conducive to innovation and where customers are free to choose from a variety of offers provided at affordable prices.

VODAFONE also notes that available economic studies and analyses indicate that the existence of parallel NGA is unsustainable. According to VODAFONE the incumbent operators benefit from economies of scale, reinforced by economies of scope, which are not replicable by other market participants. This lack of scale, suffered by the alternative operators, explains why in the past they have not invested in copper infrastructure alongside the incumbent operator. Therefore, VODAFONE argues that the available evidence suggests that the economic dynamics underlying the copper networks (higher costs of implementation and lower level of profitability for the alternative networks) will persist with respect to the implementation of fibre networks. This reality adds up to a higher costs of constructing passive infrastructure (as a result of the lengthy process of obtaining local authority authorisations, the difficulty of obtaining rights of way, cost of constructing new conduits, etc.)²⁰⁷.

Taking into account a hypothetical evolution of any of the existing cable networks in Portugal, VODAFONE anticipates that only fragments of different NGA will coexist and only in well determined urban areas of the largest cities with high population density, with significant purchasing power or in new buildings and urban developments, whereby they are unlikely to compete with each other or provide alternatives to each other at national level.

²⁰⁶ Referring to its response to question 10.

²⁰⁷ In this respect it also points to a study carried out by WIK consultants, commissioned by ECTA, in which it is concluded that only operators installed with network infrastructure of nationwide coverage and a significant base of customers will be capable of profitably rolling out an FTTH network. The infrastructure already available (conduits, accesses, buildings, street cabinets) and a customer base which more easily justifies migration from a copper network a fibre network allows significant savings and synergies, which facilitate the incumbent's decision to invest in NGN/NGA.

Question 22: Do you consider, given the stage of development of markets and the characteristics of the access network, that it is appropriate for there to be a single network supporting the offers of all operators? What impact might this have on the incentive to invest?

A single access network is not, according to the position taken by PT, the appropriate solution for the country, as it eliminates the more sustainable model of competition - at infrastructure level - and basing competition only on services, which would be harmful to innovation, economy and, of course, consumers. According to PT, this question is no longer relevant to the market, given the initiatives taken by the operators which have the capacity to roll out their own NGA. In this respect, PT argues that NGA cannot be viewed as a natural monopoly due to the fact that the incumbent is not alone in demonstrating capacity for this migration.

Additionally, it is the expectation of PT, that NGA²⁰⁸ will develop gradually (without national expression in the short term), covering different geographical areas, depending on the investment and business plans of the operators. According to PT, access to conduits is also guaranteed (by the regulatory framework) which lifts a major barrier to the construction of NGA, giving more impact to the investments made by operators.

PT concludes by arguing that regulation should focus primarily on providing balanced and non-discriminatory incentive to investment (by any operator), irrespective of the technology platform.

FCCN considers that a single operator model must be avoided. In this regard it indicates that there are areas of the country where there is a decent level of competition in the network offer, which may suggest a multiple offer of networks dictated entirely by the market. Furthermore, FCCN recognizes that there are geographical areas where there is not expected to be sufficient market for several network offers, and it suggests that in these situations a single network model based solely on point-to-point solutions should be adopted, in order to create the minimum of technological dependence for the company offering retail services. It also indicates that in this situation, ICP-ANACOM should provide transparency and protection for investments, whether private or public.

CEGEA indicates that the experience of giving independence to parts of the distribution network, while seen as innovative in the area of telecommunications, already exists in other sectors in several countries. If a similar solution were adopted, CEGEA supports the creation of appropriate incentive mechanisms for promoting investment and competition. It further considers that any such solution should be properly studied and considered before any decision is taken²⁰⁹.

²⁰⁸ Which can be supported on different platforms ("fixed", cable and mobile).

²⁰⁹ CEGEA considers it useful to analyze the first results of the British experience in the area of telecommunications, as well as the results obtained in other sectors and in other countries following the separation of parts of the network (duly set against the framework of the incentive mechanisms introduced).

According to COLT, the envisaged solution would lead to an incentive for all operators to invest, since the costs of investment in infrastructure could be substantially reduced.

ONI supports a model in which NGA is implemented and managed by a single entity, which provides access to all interested operators. The differentiation between operators would show itself, according to the operator, at the level of services rather than at the level of infrastructure. This model would also have the advantage, according to ONI, of enabling investment to be shared efficiently among all the parties involved.

As stated in its response to the above question, ZON considers that the development of a single network model may serve the interests of Portugal, and therefore of the various stakeholders. In terms of investment incentives, the single network model may allow greater efficiency in realising investment and enable its application in areas of innovation and generation of greater added value. According to ZON, joint investment in a single network:

- presents undeniable advantages of economic efficiency, enabling not only a reduction of costs associated with the civil construction works, but also avoiding additional costs associated with the management of different networks; and
- facilitates access to the buildings, since only one operator would need to gain entry (while allowing, however, access to others).

ZON suggests that a comprehensive study be carried out involving all stakeholders, to conduct a cost-benefit analysis of this model and to examine its technical feasibility.

SONAECOM also advocates a model in which one entity provides wholesale services to the other operators in the market, similar to *Openreach* in the United Kingdom, an experience that demonstrates the success of this solution, with other countries such as Italy and Sweden, taking an identical route. SONAECOM also recognizes that there are several other countries which have put this option to one side, but believes that this should not lead to less discussion of this issue but rather give weight to the need for its examination from a critical perspective.

According to SONAECOM, the current regulatory framework in Portugal manifests several shortcomings, such as the asymmetry of information between regulator and regulated entity²¹⁰, whereby in this context, it is difficult to accept the argument that the current system²¹¹ is more effective and simpler to implement, compared to an alternative model of functional separation of the infrastructure of the basic local access network. SONAECOM argues that this model leads to greater regulatory certainty for all market participants and so creates an environment which is conducive to investment and further suggests that it can be

²¹⁰ It give as an example of the number of court appeals with respect to decisions taken by the regulator, which decisions, in the opinion of SONAECOM, are the result of the execution of obligations applicable according to the regulated offers, while in a scenario of functional separation, these offers would be guaranteed by an entity which, in line with its own objectives, would have real incentive to simplify the task of the regulator.

²¹¹ Based on the traditional imposition of obligations of access according to the reference offers, the management of which is entrusted to the incumbent.

designed with contractual basis on a system of incentives which attracts investment²¹² and, above all, guarantees quality of service while taking advantage of the maximum efficiency derived from productivity factors. This operator adds that an architecture of this type is more likely to foster competition in the provision of services to end-consumers.

SONAECOM highlights the benefits derived from a shared network, such as would result from a model similar to that of functional separation, noting that the weight of civil engineering costs in such networks is very high, whereby there are clear economies of scale in the installation of fibre optics. Insofar as the network is sized for the entire market, SONAECOM believes that these economies will be maximized, contributing to more efficiency in the cost structures of the operators.

SONAECOM concludes by calling for an urgent change to the paradigm of regulation, citing functional separation as the appropriate and proportionate response to the challenges faced.

With the information available to it and based on the analysis set out in its response to questions 10 and 21, VODAFONE also takes the position that the best solution for the implementation of NGA in Portugal is the single network model. According to VODAFONE this model better contributes to the rapid development, coverage and profitability of NGA, with the assignment, by means of public concession and for a period long enough to allow return on investment, of the exploration rights to a single entity consisting of the operators currently in the market, including PT, municipalities and entities in possession of access infrastructure.

According to VODAFONE, this solution is in line with the strategic priority defined by the Government and should have access to public funding, either from the State or from municipalities, whereas this unique network should support access to all public bodies including schools and hospitals, which the Government intends to achieve by 2010. This operator states that this a solution already under consideration in other countries which, as a result of public involvement, can overcome barriers to the roll-out of NGA and to the financing of the large investments required, without unnecessary and inefficient duplication of infrastructure.

This option would also, in the opinion of VODAFONE, place all players on an equal footing with respect to the development of their retail offers, and enabling these entities to channel their investments into differentiation and innovation with respect to the end-customer. The entity possessing and managing the network, for its part, by depending exclusively on its wholesale customers would be encouraged, according to VODAFONE, to extend the network's coverage and pursue innovation, focusing its efforts and investments on ensuring simultaneously a return on investment and a competitive wholesale price.

²¹² SONAECOM notes that *Openreach* has demonstrated that the experience with regard to investment incentives has been a positive one: between 2006 and 2007, investment reached one billion pounds, rising by seventy million pounds over the previous period.

Question 23: What considerations are raised by any potential imposition of functional separation with respect to the incumbent's network?

According to PT, this a measure which goes against the consensus and which is in counter to the current state of development of electronic communications. PT considers the effects of such a measure to be intrusive, in that it may destabilise the company involved, and difficult to enact, unless the company gave its consent or it resulted from a voluntary act. In this respect, PT takes the position that this should not be included in the list of *ex-ante* obligations. PT states that the European Commission itself considered that functional separation was an exceptional measure.

According to PT, the separation (even functional) of the access network from the retail markets would have a negative impact on the encouragement of investment, on increased quality and on cost efficiency. Instead of promoting technological diversity, it considers that it would perpetuate regulation and promote the monopolization of network resources. PT believes that the current situation in Portugal is different from the situation in the United Kingdom 3 or 4 years ago, and is much more similar to the Dutch case. Accordingly, in view of PT, there is currently effective competition in Portugal at the level of products and services and various infrastructure alternatives (especially following the spin-off of ZON).

According to PT, uncertainty on this issue does not lend to the stability of the regulatory framework and makes no contribution to the implementation of the Resolution, given the impact that this would have on the operations of PT.

FCCN believes that the adoption of functional separation with respect to the incumbent's network is a model that promotes greater transparency and technological independence, whereby it supports its adoption.

According to COLT a solution which is similar to the one adopted by OFCOM could be well adapted to the national reality.

ONI believes that functional separation would ensure effectively equivalent treatment of all operators in the use of current and future reference offers. On the other hand, ONI takes the position that a functionally separate entity aligned with the objectives of providing service to individual operators would have every interest in resolving the operational problems which have been reported in the various reference offers. This entity would also, according to ONI, be especially motivated to develop their offers in order to meet the needs of its customers - operators.

Despite the effort that has been made in Portugal, ZON believes that the current model of the RAO still clearly favours the incumbent, whereby it is necessary to carry out the structural separation of the wholesale business, allowing the development of competition. However, according to ZON, the model of a single network shared among all network

operators is not feasible without the imposition of structural separation, because otherwise, the incumbent operator will use its privileged access to conduits to build its own NGA alongside the single network. ZON proposes that these changes should be made now with respect to RAO and, if necessary, by amending the LEC.

SONAECOM responded to question 23 in conjunction with the response it gave to question 22.

According to VODAFONE, the possible imposition of functional separation on the incumbent's network brings immediate benefits in terms of transparency and non-discrimination, which are important factors in the transmission of security and predictability to those who act in a competitive market who depend on conditions of access to the incumbent's network to provide their services, whereby, second to the creation of conditions for the existence of a single network, this is the best regulatory solution. VODAFONE recommends that ICP-ANACOM carefully consider the positive experience gained in the United Kingdom with the establishment of *Openreach*, in terms of benefits brought to the market, the timescales resulting from this scenario and in terms of the potential risk involved in its implementation. According to VODAFONE, the necessarily lengthy implementation of functional separation requires that special attention is given to a set of procedures and practices which are essential in order to obtain the desired results²¹³.

Despite the benefits of its implementation, VODAFONE believes that, from a regulatory standpoint, the intrusive nature of a measure such as functional separation, as well as the time needed for its enactment, cannot be ignored. Accordingly, VODAFONE takes the view that it is necessary also to consider having a transition period leading to complete functional separation, during which period short term, interim or complementary measures may be implemented.

Position of ICP-ANACOM

Most of the entities responding to the public consultation consider it necessary, at least in some areas, to maintain two parallel networks (copper and fibre optic), in order to ensure the

²¹³ In particular:

- definition and implementation of new processes of activation, delivery and management of services provided to alternative operators and the incumbent's retail unit which ensures the verifiable existence of equal treatment and non discrimination;
- training of the wholesale entity's staff not only in the new procedures mentioned above but in the principle of transparency and equal treatment, with special focus on the overall quality of the network and services and the satisfaction of the end-customer;
- permanent monitoring of the quality parameters of these processes and of the network and transparency in the disclosure of this information;
- monitoring of obligations imposed as a result of functional separation by an external entity to ensure compliance; and
- provision of incentives to the management of the wholesale company which are related exclusively to its activity and not indexed to the performance of the retail unit of the incumbent operator.

operation and maintenance of existing retail and wholesale services (in terms of LLU) and their proper migration to NGA.

The issue of migration seems to be one of the most relevant and complex challenges, given the need for balance between the desire for a fast transition (to reduce the costs of parallel operation²¹⁴ and accelerate the provision of new services) and the need to ensure that operators which have invested in LLU and depend on PT's current wholesale offers do not see their expectations disappointed in terms of obtaining an adequate return on the investments which they have already made.

In any case, ICP-ANACOM, as is better explained in section **Error! Reference source not found.**, will ensure appropriate conditions of migration to allow operators which have invested in LLU to adapt to the new developments in terms of access networks, thereby contributing to the necessary regulatory stability and upholding the interests of end-users and competition itself. In particular, PT will be under obligation to inform these operators about changes in the access network, allowing migration of their networks/services and/or their progress up investment ladder and the recovery of investments which they have made.

ICP-ANACOM will seek, in this context, a clear, transparent and consistent approach and may need to set a period, likely prolonged, during which migration must take place, in order that such migration occurs at the most appropriate time for all involved, including consumers. Preferably, the operators should agree to specific conditions and specific deadlines for this transition, which should not exceed a reasonable period, since it is acknowledged that PTC may incur technical and economic costs resulting from the simultaneous management of two networks with different architectures.

This migration process will, however, largely depend on the actual evolution of the market, i.e., the manner in which evolution to NGA takes place and the time taken.

There appears to be agreement that, NGA will develop progressively, starting in areas of higher population density and purchasing power (urban centres), then expanding gradually to other areas, at a faster or slower rate, depending also on the number of entities investing in these networks.

Since there are several factors to be considered in the analysis of economic viability, it is possible that in certain areas one entity may come to hold a position of dominance, while in other areas there may be competition between NGA. It is recognized that, given the current coverage of the cable network (though not with the same capillarity and coverage of the fixed network) and the expected technological development, it is reasonable to assume that, at least in certain geographic areas²¹⁵, there is already NGA competition between fixed network operators (either supported by fibre optic or coaxial cable).

²¹⁴ Reduction of costs for PT.

²¹⁵ E.g., in areas where there is already a competitive dynamic between the fixed and cable networks in the provision of retail broadband access services.

As one of the objectives of regulation, ICP-ANACOM has sought and will seek to promote competition in the electronic communications market, prioritising from the outset competition at infrastructure level, provided that the investment is efficient and effected in a consistent and sustainable way.

In this respect, it may be taken into consideration that, in economic terms and the from the "*perspective of social well-being*", it may be more beneficial if there were only one NGA with access provided to all operators on equal terms, given the obvious gains in terms of the costs associated with the replication of access networks. Additionally the existence of parallel fibre optic access networks in certain geographical areas may not be economically sustainable, which does not mean that there can be no competition in terms of access, for example, with technologically advanced cable network solutions, FTTCab and mobile (e.g. LTE).

More than one entity commented that the development of a single network would allow a more rapid roll-out, accomplishing therein the strategic goal set by the Government that one million customers will have access to NGA in 2010 and optimizing investments, allowing operators to concentrate on the development and provision of services²¹⁶. Additionally, it is argued that this option would allow greater evolution towards national coverage, reducing info-exclusion.

It is recalled in this context that VODAFONE proposes that this network should be implemented by a single entity consisting of operators, including PT, local authorities and other entities in possession of access infrastructure, with access to public funding. This type of solution would resolve, according to this operator, "*as a result of public involvement, barriers to the roll-out of NGA and to the financing of large investments required, without unnecessary and inefficient duplication of infrastructure.*".

ICP-ANACOM acknowledges, from the outset, that there are a number of overall economic advantages in a "single network" or "single operator" approach, especially regarding the reduction of investment costs in infrastructure and optical equipment and the potential greater speed of expansion to more remote areas.

However, there are other aspects, also mentioned in responses to the consultation, which must be considered, such as the competition model underlying this solution. In place of competition at the infrastructure level, in principle more sustainable and conducive to investment, this solution centres on a model of competition based on services. This has certain disadvantages in terms of innovation and differentiation, with possible negative implications for the consumer offer. In fact, if it is left to a single wholesale entity to select the technological or architectural solutions, these solutions may not be the most efficient, whereas, in an environment of competition between infrastructure, there is incentive to

²¹⁶ Four operators have already agreed, according to a protocol signed on 7 January 2009, to bring forward the connection of 1.5 million users as soon as 2009.

choose the most technologically advanced and/or efficient solutions, enabling greater differentiation in the provision of retail services.

Indeed, current experience seems to show that, with the development of LLU, and especially with the development of competition between different networks, fixed network and the cable network (and to a certain extent, the mobile network²¹⁷), the benefits to consumers appear to be much more evident in terms of differentiation of services (e.g. *triple-play*) and in terms of prices charged.

By contrast, it seems clear that the example of the current "single national network" of broadband access, PT's ADSL network, accessible through the RAPT offer, may not lead to the optimal development of competition in the provision of innovative retail services through - uniquely - access of the bitstream type on any single network, although this may depend on the specific characteristics of the offer.

In any case, ICP-ANACOM obviously does not oppose any joint project that seeks to develop a single fibre-optic network in Portugal, where the market as a whole concludes that this solution provides for (more) efficient investment, subject to the safeguards imposed in terms of access thereto, which ensure equal access on reasonable and proportionate terms and provide for effective competition.

Moreover, irrespective of the solution which emerges, whether competing networks or a single network, ICP-ANACOM will always and immediately reduce any barriers to the development of such network(s), intervening²¹⁸, particularly at the level of access to current passive infrastructure (conduits, poles or buildings) and the sharing of new construction works (in new urban developments), as well as in terms of the necessary sharing of passive infrastructure inside buildings.

Additionally, it was noted that there are economies of scale in the installation of fibre optics, since the weight of civil engineering costs in such networks is very high, and the implementation of a single network model could result in benefits similar to that of a model of functional separation (e.g., in a more efficient operator cost structure). Similarly, SONAE COM commented that, in the context of the development of NGA in Portugal, access to the infrastructure of the incumbent operator is "*limited by the privileged access which this operator possesses*", whereby SONAE COM argues for the functional or structural separation of PT's wholesale business, with the creation of an independent entity to manage this infrastructure, in order to create a "*level playing field*".

In order to prevent the incumbent operators (in possession of extensive passive infrastructure) from exploiting the competitive advantage which they have from the outset in an illegitimate way, in particular by obtaining privileged information or following procedures

²¹⁷ Whose broadband access offer has, more recently, attracted a high level of demand, particularly in the context of the "e-school programmes" (programas e-escola);

²¹⁸ Proposing legislative measures or acting directly, in particular by updating the technical ITED standard or through the imposition of access obligations pursuant to Law no 5/2004

which are faster and distinct from those offered to competitors in access to passive infrastructure - including conduits- ICP-ANACOM is of the position that the "principle of equivalence" applies²¹⁹. That is, PTC shall provide access to its infrastructure according to the same conditions, whether such provision is made to itself, to subsidiaries of PT or to third parties. These equivalent conditions are embodied in the following:

- Equivalence in terms of access to information²²⁰.
- Equivalence in terms of time taken to respond and to supply²²¹.
- Equivalence in terms of management of the service²²².
- Equivalence in terms of service levels agreements (SLA)²²³.

A proper and consistent application of this principle as part of a proper review of the RCAO may, in the opinion of ICP-ANACOM, create the non-discriminatory and transparent conditions referred to above, which may enable any operator to access existing passive infrastructure under equal circumstances in order to develop its network in accordance with its business plan.

The issues regarding the RCAO will be analysed again in greater detail in a later section. Meanwhile, while the fundamental importance of access to conduits, as recognized by PT, seems clear, any adjustments and improvements at this level, including a review of RCAO, should be studied and implemented in the short term, as soon as possible, so as not to delay the roll-out of NGA.

It is noted that equivalence of provision addresses concerns that are also raised with respect to functional (or even structural) separation, and such equivalence can, where properly functioning, provide an alternative to this option.

Regarding functional separation it should be noted that, despite the advantages that are often attributed to it²²⁴, it is a measure which is not currently available to ICP-ANACOM. The

²¹⁹ This is in line with that defined in the draft Recommendation, particularly in "*Annex II - Application of the principle of equivalence*".

²²⁰ Information on the location of conduits and associated infrastructure, available space in conduits and in the street cabinets, network topology, connections to and locations of street cabinets.

²²¹ The SMP operator should implement an information system incorporating the time taken to respond and supply to their own departments for the installation of NGA and must ensure that third party beneficiaries have access to relevant infrastructure in the same time.

²²² The SMP operator should ensure that requests for information, supplies and repairs made by third party beneficiaries are processed with the same speed as requests made by its own equivalent departments. Periodic reports should be published setting out the levels resulting in practice.

²²³ Delays in delivery and response should be periodically investigated, with the respective reports sent to the beneficiary for the purpose of providing compensation for non-compliance.

obligation of functional separation is not yet formally incorporated in the set of *ex-ante* obligations available to regulators, constituting, in the event of subsequent inclusion, a measure to be considered over the medium-long term.

Additionally, it should be recognized that it is a measure that would always require a reasonable period of time for implementation, i.e., that there would always need to be a transition period prior to complete and effective functional separation. In this regard, it is noted that the effective implementation of the model adopted by the United Kingdom (leading to the establishment of *Openreach*, which provides wholesale services to other operators in the market) will have been concluded within a period of not less than three years.

Furthermore, in the Portuguese case, the incumbent has always argued that the model of functional separation would not be the most appropriate²²⁵, whereby it considers any potential imposition of this measure as intrusive and disproportionate, and would not implement such a measure on a voluntary basis.

In this context, ICP-ANACOM considers that there are insufficient grounds to argue that "*the model of a single network shared among all network operators is not feasible without imposition of structural separation of the wholesale business*"²²⁶, given that it is not reasonable to wait for a possible implementation of a medium-long term measure before operators can decide on investment to be made in NGA. The current needs of the market, which involve investments in the short term, do not appear reconcilable with the periods envisaged.

In any case, in light of the market's evolution and the actual development of NGA, and, in particular, in light of the changes made in the EU regulatory framework, ICP-ANACOM will conduct, as previously stated, a thorough and timely examination of the suitability, cost-benefit and technical feasibility of imposing a measure of functional separation, with a study on this issue currently underway.

It is clarified, however, that ICP-ANACOM shall not be bound to any decision in this area, since it is matter which at the present time is outside of its remit, has not been studied in any thorough or up-to-date way and, finally, will to a great extent depend on the situation evident

²²⁴ Advantages have been cited in terms of: (i) transparency and non-discrimination, which are important factors in the transmission of security and predictability to those who act in a competitive market but whose provision of services depends on conditions of access to the incumbent's network, (ii) incentives for investment by all operators, since the costs of investment in infrastructure can be substantially reduced, allowing investment to be shared efficiently among all the parties involved, (iii) equality with respect to the development of retail offers, enabling operators to channel their investments into the differentiation (of services), innovation and generation of greater added value with respect to the end-customer, in terms of quality and diversity of services.

²²⁵ PT argues that functional separation could undermine its incentive to invest, to increase quality, and to work for technological diversity and innovation; perpetuate regulation and promote the monopolization of network resources.

²²⁶ As stated by ZON.

in the market in terms of reference wholesale offers. It is noted that experiences in the communications sector are scarce and have been developed under very particular conditions.

2.2.8 The positions of regulators and imposed obligations potentially related to NGA

Question 24: What considerations are raised by the positions - even though preliminary - adopted by the identified NRAs²²⁷, which seem to give priority, in terms of NGA and compared to the alternative of imposing immediate access to fibre optics loops, to the need to ensure:

- (a) greater transparency in information about the evolution of the incumbent operator's network;
- (b) access already granted for a reasonable period of time;
- (c) maintenance of access to the local loop only in the case of copper pair loops (possibly at street cabinet level); and
- (d) access to conduits and "*backhaul*" for connection between street cabinets and the infrastructure of alternative operators?

PT affirms that this question does not clearly reflect the main objectives of the positions presented by the main NRAs, which are focused on barriers to the installation of optic fibre in access, essentially the availability of conduits and access to buildings. The lack of stable offers of access to conduits, according to PT, have led NRAs to impose alternative obligations to ensure the maintenance of competition in the market. Therefore, the existence of the RCAO puts Portugal in a situation which is different from that of other countries, and this should be taken into account in any transposition of obligations established in other countries.

According to PT, the posture taken by each NRA in its regulatory approach to NGA must therefore depend on several factors, not always being equal, with there being a set of themes, including particularly: (i) the establishment of a predictable, clear and transparent regulatory framework is essential in order to encourage investment, (ii) the application of prevailing regulatory conditions to NGA may discourage investment in fibre optics²²⁸; (iii) the promotion of competition between autonomous infrastructure must be taken into account, (iv) the assessment of competition in different geographical areas should be considered; and (v) appropriate solutions should be promoted for access to buildings and access to conduits.

With respect to the specific points, PT argues that:

²²⁷ See Section 5.2 of the consultation document.

²²⁸ According to PT, several regulators (e.g. OFCOM, CMT and ARCEP) consider that LLU obligations should not be extended to fibre optics.

- the information provided by PTC on the access network and its evolution is more than sufficient for the purposes in question²²⁹;
- the need to ensure access already granted for a reasonable period of time is a matter that should be the object of a specific study and, necessarily, an agreement between the various stakeholders, whereby, in the meantime, the (reasonable and appropriate) deadlines and procedures set out in the RUO should be maintained²³⁰;
- access to the copper sub-loop should be subject to a detailed assessment of the interests of operators and the conditions of access to the public domain;
- access to conduits is an advantage which alternative operators have and which allows them to develop their networks, eliminating the horizontal barriers identified by the ERG.

CEGEA presents a number of considerations about the difficulty and uncertainty associated with regulatory decisions on NGA, stressing in particular that:

- certain solutions which could currently be seen as barriers to competition may, if given proper framework by the regulator and adapted by innovation, will ultimately cease to exist as constraints on competition;
- the reality existing in different national markets may vary significantly²³¹;
- in the past, measures taken were based on a market structure already known to regulators, while at present, regulators face the dilemma of choosing a structure for a sector which they will regulate in the future;
- a balance must be found between competition and efficiency, whereas efficiency gains must be transferred to consumers through competition.

CEGEA concludes that there is an important step to take in examining the merits of each of the solutions presented even though, apparently, they point towards transparency and the construction of a "*level playing field*" for all competitors.

According to COLT, paragraphs (c) and (d) of this question set out the most important conditions, without which it cannot be considered that there is transparency in the information of the incumbent operator or even be considered that there is effective access.

ONI believes that paragraphs (a) and (b) are essential to ensure the viability of the business models of operators who have invested in LLU and to allow these operators to adopt the most suitable strategies for the evolution to NGA. It does not concur with Paragraph (c), considering that access to fibre optic loops should also be ensured in situations where there

²²⁹ PT refers to the answer to question 12.

²³⁰ PT refers to the response given to question 13.

²³¹ Indicating in particular the different situations existing in the different European countries in terms of availability of the cable network.

is dominance in retail broadband markets. Paragraph (d) should be, according to ONI, always guaranteed.

Regarding point (a) and according to ZON, the implementation of mechanisms which provide for greater transparency in information on the evolution of the incumbent's network (in particular, data services provided through the Naked ADSL offer) are essential. Regarding point (b), it considers that the maintenance of access already granted for a reasonable period of time is essential to ensure the migration of services without interruption which would have adverse effects for the end-customer. Regarding point (d) ZON states that access to conduits in a transparent manner and under equivalent conditions is crucial for the success of NGA.

As for issues specifically listed in this issue, SONAECOM refers to its response to questions 6, 12 and 13, where it believes that it has carried out a more detailed analysis. Given that the consultation document examines other issues, according to the scope of this question, SONAECOM presents comments on access to vertical infrastructure and relationships with municipalities.

In the first case SONAECOM stresses the importance given by different regulators to NGA accessibility in buildings and the need to amend legislation so that is adapted to this new reality. The measures currently under review by regulators such as CMT and ARCEP have the objective, according to SONAECOM, of overcoming the significant operational constraints associated with the construction of vertical networks. SONAECOM shares the concern of ensuring the access of different operators under equal conditions to the vertical infrastructure of buildings, as well as the need to streamline procedures associated with the development of the last section of the network and ensure that new buildings are properly prepared to receive NGA²³².

In the second case, SONAECOM highlights the need for the regulator to act, at least in the exercise of its remit of supporting the government and stimulating the domestic market, in order to streamline the current rules imposed by local authorities on network operators in respect of interventions in the local authority soil and subsoil. This streamlining should focus, in the opinion of SONAECOM, not only on procedural aspects but also in relation to fees charged at municipal level (including MFRW)²³².

According to VODAFONE the (positive) measures only constitute an initial regulatory approach, whereas knowledge is lacking with respect to the results achieved by these measures in light of the conditions to be overcome and the negative impacts on competition which will result from evolution to NGA.

²³² Specific actions related to these aspects are detailed in SONAECOM's responses to the following questions.

Question 25: Do you consider that the current RCAO is sufficient for the development of NGA by alternative operators? Where is there room for improvement?

The infrastructure made available through the RCAO also includes access branches and manholes and this offer has seen significant evolution in terms of procedures, conditions and information systems, whereby PT considers that it provides operators with the conditions of access necessary for the installation of cables, in particularly fibre optics²³³. However, as far as procedures and information systems are concerned, PT acknowledges that there is room for improvement in terms of automation in the exchange of information with the operators (as occurs with respect to the RUO), which will require their involvement.

PT submits that it is still possible to improve the procedures (which are not regulated²³⁴) with respect to applications for local authority licensing and obtaining responses to be able to start work and intervene in the network, which procedures vary unjustifiably between different local authorities, with a negative impact on the actual results of implementation on the ground.

FCCN believes that the RCAO is a good starting point for the development of NGA. In this regard it indicates that:

- In preparing the regulatory framework for NGA, consideration should be given to the drawing up and maintenance of a digital register for conduits, including all infrastructure established using central or local public investment.
- The regulatory framework should cover all entities operating relevant infrastructure, regardless of the nature of their business, with greater symmetry between the various operators.

CEGEA comments that the public information compiled with respect to the RCAO indicates that there are still difficulties in access to conduits by the alternative operators, resulting from situations which range from total denial of access, excessive time obtaining authorisation or other types of discrimination. Accordingly, CEGEA indicates that, not only is it necessary to establish the obligation of providing access, but also to adjust supervision mechanisms and the sanctioning of non-compliance.

Given the possibility of using alternative conduits networks, CEGEA states that available information suggests that in Portugal there are no conduits networks with sufficient capillarity to rival the network currently managed by PTC. If this situation is confirmed, CEGEA considers that the case should be put for the functional separation of the management of conduit infrastructure, in a separate and independent entity able to manage the assets with exemption conditions to all competitors.

²³³ Operators such as TVTEL, COLT, ONI and SONAECOM have made use of this offer for the installation of optical fibre between the premises of customers and their networks.

²³⁴ For example, have no deadlines or penalties for non-compliance.

COLT considers that the current RCAO is a good starting point with urgent improvements which need to be taken into consideration, including:

- the records of the dominant operator require updating so that the information is both clear and accurate;
- the inclusion of other infrastructure which can be used by operators, not only conduits - e.g., poles;
- the inclusion of SLAs and penalties for non-compliance;
- the implementation of faster and less bureaucratic processes of access to the offer itself.

According to ONI, the RCAO suffers from several operational problems²³⁵ which prevent it from being an agile solution to the infrastructure needs of beneficiary operators.

ZON takes the position that the ORAC is a positive step provided by the national legislature, playing an important role in promoting investment in the network. However, contrary to the other regulated offers, ZON considers that the RCAO ultimately allows positive discrimination in favour of PTC, not embracing the obligations of transparency and non-discrimination in full.

As such, ZON argues that with respect to this offer, ICP-ANACOM could impose clear and unambiguous obligations of transparency and non-discrimination, putting an end to situations of asymmetry in the access to and management of information and requiring that access is provided to infrastructure covered by the offer to all operators, including PTC, according to equal conditions. Specifically, ZON proposes (i) reduced intervention times, (ii) improved information systems, including the provision of information on available space in conduits (iii) observation by the incumbent of the same rules.

ZON considers, as mentioned above, that it is essential to create an entity which is legally distinct from PTC with possession of infrastructure and with responsibility for the management of conduits and associated infrastructure and all other assets covered by regulated offers. Besides the advantages mentioned above in terms of the benefits of structural separation, ZON argues that this solution is a response to the concerns manifested by the operators regarding the overcrowding of the conduits²³⁶.

As it has argued in its responses to earlier questions, SONAECOM recalls that the main cost component of the future implementation of the optic fibre access networks is related to the execution of civil engineering works (installation of underground conduits and poles)

²³⁵ Which it states have been raised in communications from ONI and APRITEL (together with their proposed solutions).

²³⁶ Since the company would be independent it would, in the opinion of ZON, transmit information in a transparent manner on the occupation of the conduits and take the decisions necessary for their proper management.

associated with the installation of fibre optics²³⁷. Accordingly, SONAECOM argues that the conditions governing access and use of conduits - particularly the conduits of PTC, due to the fact that they are dedicated to telecommunications and present a special degree of capillarity - are a determining factor as to whether the process of rolling out NGA can occur in a way that is competitive.

SONAECOM recognizes that, in theory, the existence of the RCAO increases the possibility of access to this underground infrastructure by third party operators based on procedures and conditions which are transparent and non discriminatory. However, contrary to the optimism conveyed by the words of the regulator, it believes that the current offer is a long way off from implementing an appropriate regime of access to and use of necessary infrastructure which is effective and non-discriminatory.

According to SONAECOM, the first detailed version of the offer was published in June 2006 and so that it has been in place for a relatively short time. The operator adds that over the last 2 years, the offer has not been put to the test since the volume of requests has been low compared to the high volume of requests, which in all certainty will come in the near future with the roll-out of NGA - in this respect SONAECOM states that from its recent experience of the operational implementation of the RCAO serious shortcomings are noted.

SONAECOM presents a summary of the main problems which, in their view, affect the RCAO and proposed resolutions namely:

Issue	Solution proposed by SONAECOM
Non-inclusion of access to poles in RCAO and difficulties imposed by PTC, through the adoption of discriminatory conditions which do not respect the principles of transparency, non discrimination and cost orientation.	Inclusion of poles in RCAO (in accordance with paragraph 1 of art. 26 of LEC).
Lack of record information which allows the feasibility of using conduits to be appraised, constituting therein a breach of the determinations of ICP-ANACOM.	Actions of supervision and sanctioning of breaches in order to encourage compliance with rules which have already been determined.
Total and advance knowledge of PTC with respect to the fibre optic installation work of the RCAO beneficiaries, with a minimum of 30 days, in the specific areas in which these beneficiaries intend to develop their network.	Give autonomy to the processes for requests for information, viability and scheduling of interventions for fibre optic installation via Extranet ²³⁸ .
Potential competitors are required to schedule a date for intervention with PTC, which requires PTC's	The technicians of the beneficiaries are certified by PTC itself, whereby the obligation that PTC provide supervision with the costs borne by beneficiaries

²³⁷ SONAECOM cites support in statements made by ICP-ANACOM and the Commission.

²³⁸ According to SONAECOM, having record information, the beneficiaries will be able to gauge automatically and independently the existence or otherwise of conduits, and respective viability. The introduction of an interface that allows certain sections to be reserved, with indication of the date, will, according to SONAECOM, be sufficient to reduce the current notice of 30 days to about 7 working days.

agreement, with the costs borne by the beneficiaries.

Whenever it is necessary to clear an obstruction, PTC submits a request for authorization to the local authorities, which involves considerable costs and delays.

The RCAO provides for no SLA and no penalties which deter lack of compliance with respect to all stages of the process, as is the case in which PTC interacts with the local authorities.

The submission of demand forecast plans by beneficiary operators gives PT advance knowledge of its competitors' business plans²⁴⁰, putting it in a privileged position where it can block the installation of fibre optic by operators, ensuring that - in the routes in question - PTC itself is the first to arrive.

Finally, SONAECOM argues that the RCAO is not an access solution able to guarantee effective equality of opportunity for all operators in the context of NGA, due to the fact that PTC, unlike all the other operators, does not use the RCAO and does not observe the conditions and procedures for access therein, which situation would be resolved by implementing a model of functional separation.

According to VODAFONE, the principles underlying the establishment of the RCAO are a clear incentive to the promotion of investment by operators and to the consequent development of their networks, although it essential to obtain a comprehensive knowledge of the location and available capacity in each part of the access infrastructure.

The RCAO's current method of making the information available, based on a request for information and viability through requests and responses on a case by case basis is, in VODAFONE's opinion, extremely restrictive and does not allow the rapid analysis of existing resources in large areas. Accordingly, VODAFONE proposes that a source of information be created, updated in real time, enabling operators to view details on all infrastructure in a given area, the feasibility of occupation and the amount of occupied capacity.

According to VODAFONE, complete transparency in relation to the allocation of resources with equitable criteria will be a key factor for the development of these networks. The guarantee that no prior reservations of resources are made by any of the stakeholders and that requests are processed strictly on a first come first served basis is a particularly critical aspect, which VODAFONE considers requires constant supervision and enforcement by ICP-ANACOM, and immediate action in cases where the beneficiaries seek intervention.

should be eliminated²³⁹.

The same procedure should be adopted as for the work carried out at PTC's own initiative, in which intervention is subject only to notification *ex-post* to the municipal council.

The inclusion of such sanctions is necessary, and when they relate to phases which are dependent on third parties, there should at least be a deadline by which intervention is requested by PTC (as well as for notification of the response).

Elimination of this condition of the reference offers.

²³⁹ SONAECOM proposes that PTC should retain the right to informed with 24 hours notice prior to the intervention so that they are able, if they so wish, to send out their technicians.

²⁴⁰ SONAECOM comments that the other reference offers also feature this structural problem.

VODAFONE also adds that the current RAO has various shortcomings, in terms of pricing and levels of quality of service²⁴¹, which is not compatible with the essential development, in a widespread and rapid form, of the network by the alternative operators.

Position of ICP-ANACOM

The majority of the entities that responded to the consultation considered the measures presented by some European regulators necessary and positive²⁴², pointing towards greater transparency and the establishment of a "*level playing field*" for all operators, and which result from any previous experience gained in addressing the problems of the market established by the roll-out of NGA in their respective countries²⁴³.

However, it is noted that the regulatory approach is in an initial phase, a phase of technological and market evolution, and further examination of these measures and better knowledge with respect to their results is necessary, whereby there may be an important step to take in this respect given that in the past, measures which have been taken have been associated with markets whose characteristics are well known to regulators.

Furthermore, PT states that the main concerns of regulators have focused on barriers to the installation of fibre optic access, mainly the availability of conduits and access to buildings. This last point is also highlighted by SONAECOM, stressing the need for adaptation of legislation "*to the new reality*"²⁴⁴.

Note is made of the document of the ERG Common Position on the regulatory approach to NGA, which focuses on the (technical and economic) issues of NGA roll-out on the fixed networks and the regulatory implications. To formulate this approach, i.e., so that regulators can provide clear indications as to the regulatory environment, it is necessary to know, in a transparent way, the intentions of the operators which seek to invest in NGA. This transparency should also exist in the provision of information on the evolution of the access

²⁴¹ In this respect VODAFONE states that the levels of quality of service, while neither ambitious nor punitive, do not discourage PTC from failing to comply, especially in situations where minimum deviations with respect to the estimates previously submitted do not incur any payment of compensation.

²⁴² Identified in the consultation document.

²⁴³ Regarding the specific points (from question 24), the following was stated by PT:

- The guarantee of greater transparency in information about the evolution of the incumbent operator's network is fundamentally important to operators, which information, according to PT, is already adequately provided.
- In the most part, it is argued that there is a need to ensure access already granted for a reasonable period of time (to be agreed between the various stakeholders) in order to ensure migration occurs without interruption to services (i.e., no impact on the end-customer).
- According to PT, access to the copper sub-loop should be subject to a detailed assessment of the interests of operators and the conditions of access to the public domain.
- Access to conduits should always be ensured, in a transparent way and according to similar conditions, allowing operators to develop their networks by eliminating the horizontal barriers identified by the ERG.

²⁴⁴ The measures currently under review by regulators such as CMT and ARCEP have the objective, according to SONAECOM, of overcoming the significant operational constraints associated with the construction of vertical networks.

network of the incumbent operator (with impact on the provision to beneficiary operators of wholesale access offers).

The position taken by the ERG, which is also shared by ICP-ANACOM, as already noted, is that the principle of promoting effective and sustainable competition at an infrastructure level remains appropriate. In this respect, the ERG highlights the technical issues and issues of implementation, particularly regarding the need for access to street cabinets (and sub-loop) and access to conduits (e.g. of the incumbent operator).

The discussion, at European and national level, appears to focus primarily (but not exclusively) on the conditions of access to passive infrastructure, particularly to conduits, and in another vein, access to buildings.

ICP-ANACOM considers that the conditions governing access to and use of passive infrastructure (including conduits) are and will be a determinant factor in the development of networks in Portugal (including of course the network of the incumbent operator), in order that the roll-out of NGA might take place in a form that is competitive.

In Portugal, this access is regulated through the reference offers of PTC, the RCAO, which PT argues is appropriate for "*the installation of telecommunications cables*", according to the conditions therein.

ICP-ANACOM, along with the majority of respondents to the public consultation, recognizes the importance of the RCAO as a means of guaranteeing the possibility of access to this passive infrastructure by the operators, promoting investments in their own networks²⁴⁵ and as such this offer constitutes a good starting point. Therefore, it is also recognized that this wholesale offers can and should be improved in terms its efficiency (e.g. in terms of procedures) - which PT itself also recognises - and its suitability to the principles of transparency and non-discrimination in access to and use of infrastructure.

It is noted, however, as it is also recognised by SONAECOM, that the effective implementation of the RCAO is still recent and that it has not yet been "*put to the test since the volume of requests has been low compared to the high volume of requests ... [expected] with the roll-out of NGA*". There is not therefore a great deal of experience with respect to the execution of this offer by PTC, operators or ICP-ANACOM, which would be valuable to a review of this nature. In this context, it may be difficult to make a judgement as to the specific procedural aspects, such as time taken to respond to requests made by operators or on local authority relations/procedures, which take on special importance in the RCAO, in contrast to most of the other wholesale offers of PTC (where there is already extensive regulatory experience).

In any case, given the importance of the RCAO, ICP-ANACOM will, in the short term and according to separate Determination, conduct a thorough examination of the issues related

²⁴⁵ At the same time it may reduce the main cost component in the roll-out of NGA, the execution of civil construction works (e.g. installation of new conduits) for the installation of fibre optics.

to this offer, including the issues and proposals submitted in response to this consultation, in order to carry out a proper review of this offer, which has fundamental bearing on the NGA challenge.

This review will seek to follow the principle of "equivalence of access" explained in the previous section, to create a truly "*level playing field*" for all operators, at the level of access to the basic infrastructure for the development of NGA. In this regard, SONAECOM alleges that PTC, in contrast to all the other operators, does not use the RCAO and does not observe the conditions and procedures governing access. According to SONAECOM, this unique advantage is in itself a major obstacle to the existence of a "*level playing field*" for the development of fibre networks by alternative operators.

More specifically, the various entities identified different "restrictions" and proposals for improvement, in respect of which the preliminary position taken by ICP-ANACOM is presented below:

(i) *Inclusion in RCAO of other infrastructure which can be used by operators*²⁴⁶

The RCAO does not specifically provide for access to poles (or other infrastructure), even though art. 26 of LEC sets out that "*the concessionaire of the telecommunications public service shall, by agreement, provide undertakings providing publicly available electronic communications networks and services with access to conduits, poles, other installations and property which it owns or manages, for the installation and maintenance of their systems, equipment and other facilities.*" (Emphasis added by the author).

While to date, there does not appear to be a high level of demand for access to poles by operators, ICP-ANACOM considers that in a desirable scenario of NGA expansion to the most remote and/or less densely populated areas, this situation should change by itself. Indeed, in these areas PTC's conduit network has neither the same capacity nor capillarity and poles will form a substantial part of passive infrastructure. That is, in a substantial part of the national territory, in terms of coverage, a large percentage of PTC's network is based on aerial routes.

Additionally, ICP-ANACOM takes the position that access to "*other installations and property*" included in the infrastructure of PTC, such as space available in exchange buildings and cable paths inside the same buildings, may be necessary to ensure to the continuity of the network routes (and also irrespective of whether they are constructed using underground infrastructure or aerial cables using poles). It is possible that in certain situations, the most efficient (technically and/or economically feasible) solution for extending fibre optic cables across large distribution and access networks involves passage through buildings or other properties of PTC (already served conduits or poles), possibly with the installation of optical equipment in such locations, such as an ODF.

²⁴⁶ Several entities referred to the importance of access to other passive infrastructure, eg poles, which are not currently covered by RCAO.

ICP-ANACOM considers that access to poles and other installations and property for the installation of equipment and fibre optics constitutes a strong incentive for operators to invest in their own infrastructure and may help promote greater certainty and predictability in the expansion of NGA, in particular to these more remote areas, with ultimate benefit for end-users, with a probable reduction in info-exclusion.

The Portuguese Government, in the resolution cited above, argues in this regard that "*It is thus essential (...) to adopt measures that lead to an open and non-discriminatory access to conduits, poles and other facilities*".

Consequent to paragraph 4 of art. 26 of the same document, "*the concessionaire shall make available an offer of access to conduits, poles, other installations and property, which offer shall include the conditions of access and usage, in accordance with terms to be established by the NRA.*" ICP-ANACOM will, in said autonomous Determination, reformulate the scope of the RCAO, so that this offer comes to include the provision of poles and masts and to detail the conditions of access. It is further considered that the entry of fibre optic in the cable input tunnels in the exchanges may, as provided for in the RCAO, be performed by alternative operators (i.e., by entities accredited by PTC).

(ii) Need for greater transparency and non-discrimination in access to and management of information and equality in access

ICP-ANACOM will continue to intervene with respect to the RCAO to ensure greater transparency and non-discrimination in the access of operators to essential infrastructure²⁴⁷ for the faster and more efficient development of NGA in Portugal.

Such intervention may take place at different levels, including at the level of information to be made available (including records) by PTC, processes and quality of service (SLA), as discussed in the following points.

(iii) Lack of complete conduit record information which would allow prior assessment of the viability of their use

ICP-ANACOM has already supported, on several occasions and with respect to the determinations on the RCAO, the importance of a complete and updated register of existing infrastructure, specifically of conduits, both in terms of the routes (information already available on the basis of data accessible through an Extranet) and their current occupation. This information, which ICP-ANACOM has obliged PTC to make available to beneficiary operators²⁴⁸, has become essential so that these operators can obtain timely, accurate and comprehensive knowledge of the location and available capacity in terms of passive infrastructure, allowing them to conduct a faster and more efficient assessment of the

²⁴⁷ Which has also been recognized by PT, on several occasions.

²⁴⁸ An obligation which is already set out in ICP-ANACOM determination of 17 July 2004:
<http://www.anacom.pt/render.jsp?categoryId=211482>.

viability of their use for the installation of fibre optic in a determined area or at a broader regional or even national level. It is accepted in this respect, however, that different priorities may be agreed upon according to the type of area covered.

Additionally, the possibility of assembling and maintaining a record information system encompassing all infrastructure, and the manner of operation, has been considered by ICP-ANACOM, in particular in response to the Government with respect to its Resolution.

(iv) Implementation of faster and less bureaucratic processes

PT, in its response to the public consultation, accepts "*that there is room for improvement in terms of automation in the exchange of information with the operators ("as occurs with respect to the RUO"), which will require their involvement*". They also advocate a reduction in the complexity, and especially, the deadlines set out in the current processes and procedures.

ICP-ANACOM obviously agrees that it would be advantageous to reduce the complexity and "manual intervention" in the operational procedures underlying wholesale reference offers. The recent implementation of the Extranet to provide access to the conduit record database of PTC is a step in this direction.

The RCAO could encompass the development of an "Information System (RCAO IS)", possibly in line with the RUO IS (as referenced by PT) or an extension of the Extranet (as proposed by SONAECOM), enabling the automatic handling of operator requests (and PTC's responses), giving autonomy and speed to the procedures for requests for information, scheduling and feasibility of interventions for the installation of fibre optic²⁴⁹.

In any case, it falls to PTC, together with the beneficiary operators, to discuss and implement the information system/application which is more efficient and which is more appropriate to their needs, as has occurred in respect of other reference offers. If there is no agreement, within a reasonable period of time, in relation to specific aspects of technical implementation, ICP-ANACOM may intervene. Also in this case, beneficiary operators should seek maximum efficiency, since they are an active part of the process (especially insofar as they are responsible for many of the activities and interactions involved).

Finally, it is noted that any gains in terms of bureaucracy/automation should be passed on to operators in the form of reduced response times (e.g., time taken to respond to requests for viability or installation), which will ultimately benefit consumers, who will have faster access to services based on these infrastructures.

(v) Inclusion of SLA and non-compliance penalties

²⁴⁹ SONAECOM notes in this respect, the minimum notice of 30 days given to PTC about works for the installation of fibre optic of RCAO beneficiaries, in the specific areas in which the beneficiaries plan to develop their network. Additionally, operators are required to schedule a date for intervention with PTC, which requires PTC's agreement, with the costs borne by the beneficiaries.

ICP-ANACOM recognizes that there are no penalties provided for in any of the "phases"/processes of the RCAO, whereby consideration should be given to the establishment of mechanisms which encourage PT to monitor and intervene to remove any obstacles to the progression of processes with respect to the requests of beneficiaries with the same speed and interest as when handling their own requests. That is, the requests of the beneficiaries, in light of the principle of equivalence, should receive equivalent treatment to those of PT itself.

In any case, according to its oversight duties, ICP-ANACOM will continue to watch developments in this area and may, at any time, particularly in the event that its intervention is requested by the beneficiaries, conduct investigative actions on the ground, which procedure is provided for in ICP-ANACOM's activity plan. Any breaches of the conditions set out in the RCAO will always result in a penalty for PTC.

(vi) Submission of demand forecast plans

It is alleged by the RCAO beneficiary operators that the submission in advance of demand forecast plans allows PTC to obtain prior knowledge of the business plans of its competitors, "*putting it in a privileged position where it can block the installation of fibre optic by operators, ensuring that - in the routes in question - PTC itself is the first to arrive.*" as stated by SONAECOM.

ICP-ANACOM has analyzed this issue and, in a future Determination, will review the model governing the provision of information in respect of the wholesale reference offers, including demand forecast plans. However, it should be pointed out from the outset that the demand forecast plans make sense at an early stage of the offer as they enable the regulated operator to scale its resources, allowing it to adapt the offer to meet the demand and satisfy, within the established deadlines, the requests that occur. However, in a phase where conditions have stabilised or where there are no significant fluctuations in demand, the requirement to submit these plans could be reassessed.

Additionally, a review could and should be conducted of the procedures relating to the viability of access requests, in practice sent by RCAO beneficiary operators far in advance of actual implementation, thereby providing PT with knowledge, far in advance, of their plans for the development of fibre optic networks, putting these operators at a potential disadvantage, which is especially important at an early stage of network roll-out.

(vii) Scope of access to infrastructure

PT identified possible improvements in this field whereby the physical infrastructure belonging to other entities, whether underground or not, could be opened up for the installation of the telecommunications infrastructure. Other entities, such as VODAFONE, have cited a similar position, i.e., not only the infrastructure of PT, or a dependent thereof, should be shared, which suggests the definition of a transparent and non discriminatory framework, ensuring full access (necessarily paid) for interested operators to all

infrastructure under public, semi-public and/or private ownership, capable of driving the expansion of NGA, regardless of the type of network (single or not). Meanwhile, SONAECOM considered it a priority to focus on access to the conduits of PTC which, because they are designed for telecommunications and because of their particular degree of capillarity, are clearly superior to those of other entities.

ICP-ANACOM has argued that the promotion of a truly "*level playing field*" for all operators, including the incumbent, which establishes the conditions for a rapid and extensive development of NGA and genuine competition in terms of infrastructure, requires the real possibility of access to the different passive infrastructure located in the national territory and suited for the installation of fibre optic cables, such as the poles and conduits of the concessionaires of public services or even the systems of water supply and/or sewerage (belonging to local authorities or other public bodies).

Note is made in this respect of the position of the Government on this issue (See Resolution): "*access by all operators to underground infrastructure has a growing importance, considering that the costs for building conduits are a considerable part of investment on fibre optics. (...) Adopting measures that lead to an open and non-discriminatory access to conduits, poles and other facilities - belonging both to communications operators and to entities that, even though operating in other sectors, hold extensive conduit networks - is thus essential.*"

Accordingly, the Government considered that "*measures must be taken aiming at the following outcomes (...) to adopt the legislative acts or others needed to ensure access by all operators, under equal terms, to the network of conduits and remaining relevant facilities from all entities holding this type of underground infrastructure,*".

These conditions of access, to be examined and defined, should include aspects such as the provision of information and conditions of viability and use of conduits or other infrastructure (such as poles), pricing and quality service.

(viii) Symmetry and sharing of investment

If, as already noted, the operators should derive benefit from access to the conduits of PTC according to transparent and non discriminatory conditions, investment costs in new infrastructure should be shared, as recommended in the draft Recommendation: Where NRAs find that one or more operators have SMP in Market 4 (including shared or fully unbundled access), they should mandate access to new and existing conduits (with associated measures and processes necessary to ensure access is effective), civil

engineering works and other elements which are not active, necessary for the roll-out of competing infrastructure, and in particular of fibre, street cabinets or an optical equivalent²⁵⁰.

Accordingly, and given that the regulatory framework should encompass all operators with relevant infrastructure and interest in developing networks and services based on NGA, whether the incumbent operator or fixed operators or cable networks, greater coordination must be promoted between these operators at the level of access to passive infrastructure to be built.

Indeed, according to the draft Recommendation, regulators should facilitate and encourage build-and-share projects between SMP operators and other alternative providers at the time of new investments to replace or establish cables, conduits and other facilities, and that in an FTTCab scenario, NRAs should enable mandatory access to conduits and street cabinets and sharing of civil works to enable infrastructure-based competition²⁵¹.

That is, in a scenario of development of new infrastructure supporting NGA, greater efficiency is desirable, including through the sharing of civil engineering costs, e.g. in terms of conduits and infrastructure (including optical fibre) inside buildings. This final aspect will be discussed later, particularly in Section 2.2.12.

In this respect consideration might be given to the explicit provision in the RCAO for the possibility that investments in new infrastructure projects, including conduits or poles, might be effectively shared between PT and the beneficiaries which are clearly interested in the project.

It is noted in this respect that the RCAO already sets out that a beneficiary may reserve space for their cables in new conduits and associated infrastructure to be constructed by PTC²⁵². The acceptance of the "Global Detailed Project" of PTC, with the "reservation of space" requested by the operator, bind it to *"the delivery of a bank guarantee to ensure compliance with the payment obligations, to an amount corresponding to the monthly charges for occupation, with respect to the area and length requested, for a period of 3 years"*.

Although this option allows operators to immediately ensure the conditions to develop their network (with the reservation of space in new infrastructure), ICP-ANACOM considers that cost-sharing (and risk of investment) might be encouraged with respect to the development

²⁵⁰ para 4, page 5: *"Where NRAs find that one or more operators have SMP in Market 4 (including shared or fully unbundled access), they should mandate access to new and existing ducts (with associated measures and processes necessary to ensure access is effective), civil engineering works and other elements which are not active, necessary for the roll-out of competing infrastructure, and in particular of fibre, street cabinets or an optical equivalent"*.

²⁵¹ See para 11, page 6: *"NRAs should facilitate and encourage build-and-share projects between SMP operators and other alternative providers at the time of new investments to replace or establish cables, ducts and other facilities. (...) [in an FTTCab scenario] NRAs should enable mandatory access to ducts and street cabinets and sharing of civil works to enable infrastructure-based competition"*.

²⁵² See Chapter 5 of RCAO: "5. Project and construction of new conduits and associated infrastructure".

of new passive infrastructure, a key component in the cost of NGA, where all operators can share the cost of "civil engineering" (including the planning, opening of trenches, permanent manholes, conduits and their installation, etc.).

Accordingly, it is considered that the RAO should set out that operators interested in participating in a determined construction project of new infrastructure (e.g. conduits or poles) can share the real and effective costs of civil engineering, in proportion to their planned needs for space, with a "one-off" payment upon the project's conclusion. With this option, beneficiary operators would not have to pay the monthly price currently set forth in the RAO²⁵³. Accordingly, and given that the costs of maintaining the passive infrastructure are reduced, it may be considered that there is no place for any monthly payment by the operator which reserved space for the use of that infrastructure.

Consideration could also be given, in principle, to the possibility that PT might benefit from a risk premium associated with investment in the construction of new civil engineering infrastructure²⁵⁴, but it should be noted that in this case PT already has a guarantee of return on investment made for the benefit of operators in both cases. Indeed, in both the current model, with a mandatory bank guarantee equivalent to three years of monthly fees, and in the model now proposed, in which the operator(s) pay(s) the total costs incurred in a lump sum, there will be genuine sharing of investment and risk.

Obviously, other operators which, subsequently, seek access to such infrastructure, provided that there is available space, will be required to follow the current "normal" rental model with monthly payment.

As mentioned in the consultation document, the draft directive presented by the Commission²⁵⁵ provides for the possibility of determining the sharing of resources or property in a general way and in all cases where an operator has obtained rights of way. The system proposed by the European Commission further establishes the (future) possibility of imposing sharing in all cases - with respect to the entrances to buildings, poles, antennae, conduits, manholes or street cabinets -, in symmetrical form, regardless of the existence of SMP, whereby an important contribution may be made in terms of installation of new infrastructure.

Finally, the position is taken that there should be no constraints on access to the conduits of new urban developments and that symmetry of access to these sections of infrastructure must be respected, according to the models now proposed and according to the conditions specified in RAO, which will be revised accordingly, and in the new ITUR regime.

(ix) Other Matters

²⁵³ Obviously, until the initially reserved capacity is exhausted and/or there are additional requests for capacity.

²⁵⁴ The situation in the case of access to fibre or "bitstream" offers may be different.

²⁵⁵ Proposal to amend the Framework Directive, presented by the Commission on 13 November 2007 (article 12), undergoing a co-decision procedure between the Council and the European Parliament.

Issues such as the functional separation of the manager of conduits and associated infrastructure into an autonomous and independent entity or such as local authority procedures and licensing (e.g. delays in obtaining responses to requests to start work and intervene in the network) are addressed in other sections of this document.

2.2.9 Common position of the ERG

Question 26: How do you view the inclusion of fibre optic loops in the (new) relevant market 4? Do you identify the same type of constraints in the development of fibre optic loops as seen with respect to the copper network? What are the resulting regulatory implications, in terms of obligations (currently imposed with respect to copper loops), including unbundling (full and shared)?

According to PT, NGA will develop gradually, starting in the areas of highest population density, centred on large urban centres²⁵⁶. PT adds that in these areas the level of competition is higher, whereby it does not consider that this company has a dominant position²⁵⁷, and it expects that over time it will be released from existing obligations. According to this framework, PT states that it does not make sense to impose new obligations of access (to fibre optics) in Market 4, including because in an environment of infrastructure-based competition all operators (including cable operators) face similar conditions regarding the development of NGA. Meanwhile, in other areas with little commercial appeal, PT takes the position that it is unlikely that operators will invest in NGA.

CEGEA indicates that the complete unbundling of optic fibre is a solution which can be considered in parallel with bitstream offers, particularly in the case of point-to-point solutions.

COLT agrees in general terms with this possibility.

ONI also considers that fibre optic loops should be included in the new market 4. According to ONI, once a fibre optic access network is installed in a location, it makes little economic sense to install a second network, whereby it considers that it is necessary to impose obligations on the dominant operator regarding access to such infrastructure by other operators.

ONI further notes that, depending on the topology of the access network, the situation may be equivalent to the unbundling of copper loops (point-to-point topology) or more complex in terms of unbundling (point-to-multipoint topology). The experience of the RUO could serve to define a reference offer that is suited to fibre optics, in which the first case will be similar to a complete unbundling of the loop and the second, unbundling of the sub-loop (where it is

²⁵⁶ More profitable areas where alternative operators are also present (using cable and LLU).

²⁵⁷ Neither in the subscription television market, nor in the broadband market (perhaps the two major markets associated with the NGA).

possible to access the optic fibre in the last splitter before the customer). In the latter case, ONI also considers it necessary to ensure backhaul up to the beneficiary operator's network (access to conduits or dark fibre). In the case of PON networks where there the unbundling of fibre optic is not possible at the last splitter, ONI supports the imposition of a bitstream offer.

As it has been arguing, according to ZON, regulation should be neutral from a technology point of view and, as such the operator considers that the fibre optic form part of Market 4.

In this respect, SONAECOM considers that the reasoning behind the imposition of obligations on the copper network is also applicable to access networks, reiterating the position given in its response to question 19.

According to VODAFONE, the principles that led to the designation of an entity with SMP in broadband accesses over the current copper network persist with respect to the roll-out of NGA whereby, in a scenario where the NGA is the property of the incumbent operator or even in a situation where NGA is run by a consortium to which obligations of access apply, VODAFONE advocates the imposition of *ex-ante* regulatory obligations in a technologically neutral form.

The identification of the need to unbundle the copper loop remains, in the opinion of VODAFONE, arguing that in the case of NGA, the regulatory solution must evolve to allow access to fibre optics. Since the access infrastructure is difficult to replicate and since a determined entity holds dominance over access, VODAFONE considers that the fibre optic loops will, necessarily, need to be included in the new Market 4 due to the fact that they constitute physical access which embodies the provision of broadband access.

Question 27: With respect to NGA, do you consider it appropriate to consider the definition of geographically segmented markets within the country or some type of geographical differentiation of regulatory obligations? In which markets? In what way?

PT comments that the process of conducting a segmented analysis of the markets is being carried out by several NRAs, particularly in countries where cable networks have a greater bearing compared to the copper network (e.g., United Kingdom, Austria and Spain).

Therefore, given the characteristics of the Portuguese market, with geographically differentiated levels of socio-economic and competitive development and with a cable operator which has a network with a large degree of capillarity in all of the most profitable areas, PT considers that there are grounds for carrying out a similar process in Portugal, including in the context of NGA. Indeed, PT considers that segmentation will be more evident in this context, since these networks will develop in a progressive manner, starting in areas of greater commercial appeal and greater intensity of competition. PT also comments

that it is important that the conclusions of the geographical segmentation are necessarily evaluated with respect to the RUO and all relevant markets.

Noting that the geographic segmentation of the markets for wholesale broadband is an instrument of deregulation with respect to the historic network, PT considers that one of the main conclusions which ICP-ANACOM should draw from this consultation is that the NGA should not be regulated.

ALCATEL-LUCENT argues that the country should be divided into three area types, to avoid the "digital divide":

- large cities - where direct competition should be ensured by the easy access of all to the passive network infrastructure, for example, through a coordinated municipal effort;
- medium-sized cities and suburbs - through a "model of open passive access", with the provision by the operators of infrastructure for access to conduits and dark fibre;
- areas of low density - through "a model of open active access", with the network operator providing wholesale access at the Ethernet or IP level.

According to ALCATEL-LUCENT, public investment should be limited to cases where a return on private CAPEX is deemed impossible, whereas public intervention should work to encourage collaboration between all entities, operators and suppliers. According to this manufacturer, the total cost of CAPEX in the centre of a city with high population density stands at around two thousand euros per subscriber, and seven times this amount in rural areas.

FCCN considers the definition of geographically segmented markets and, as a consequence the geographical differentiation of imposed obligations, to be appropriate as a way of promoting a greater degree of uniformity in the offer. In this regard it indicates that there is a clear digital divide between the coast and the interior, on the mainland, and between the mainland and the autonomous regions.

CEGEA indicates that operators tend to invest in the development of NGA in the larger urban areas, whereas the more sparsely populated regions with less purchasing power are relegated to second place.

In the latter case, CEGEA anticipates two different situations:

- the market is not large enough to support the activity of any operator; or
- the market is only large enough to support the activity of one operator.

According to CEGEA there are grounds in both cases for regulatory intervention in order to, in the first situation, ensure the existence of supply and promote inclusion and, in the second situation, to encourage competition, through the obligation of granting access to alternative

operators or a *bitstream* offer. CEGEA also indicates that regulatory impositions at this level should be structured so as not to destroy incentives for investment and be based always on a logic of increasing the value offered to the end-user.

Given the size of the country, COLT believes that the market should have a national scope and not be segmented into different geographical areas (although it accepts that exceptions might be made in some small segments).

ONI is opposed to the definition of geographic markets because it considers that the country is too small for this definition to occur. On the other hand, in the event that separate geographic markets are defined according to the separation of areas which are supposed competitive from other areas, according to ONI, there are two problems:

- In competitive areas there will be an effect of local monopolies being created by the *first mover*²⁵⁸, that is, the first operator to install an NGA. Since the incumbent operator is already located across the country and has the advantage of being in possession of the copper access network, which is expected to evolve naturally into NGA supported over FTTx topologies, ONI believes that it is natural that ultimately this operator will take the position of first mover in the majority of places considered competitive.
- In non-competitive areas it will be typically difficult to achieve economies of scale and the returns which make the installation of NGA viable. As such, according to ONI, the alternative operators will be pushed out of these areas, and at the same time, PT will have no incentive to invest in NGA.

ZON recognizes that the adoption of a model with various NGAs, some on only a local or regional scale, could lead to situations of individual dominance in territorial districts where the access network has already been implemented and the networks are closed. As such, it considers that ICP-ANACOM should, in the context of analysis of geographic markets, define relevant markets with a regional or local scale (and not national) and identify SMP in these markets, to ensure the existence of regulated offers which provide for access on equal terms to the different operators.

SONAECOM takes the position that with respect to NGA, the definition of regional markets is not appropriate, as it may create a regulatory framework which leads to two-speed development in the country: some parts of the territory will see development of alternative and competing networks; while in others there may be a monopoly in infrastructure or even, the absence of investment by any single operator in a monopoly position able to achieve positive operating conditions²⁵⁹.

²⁵⁸ This is because, according to ONI, given the investments in question, it is natural that no operator would try to roll-out a network in area which is already served.

²⁵⁹ In the latter case, SONAECOM takes the view that the regulator should establish minimum conditions of public service and guarantee that supply based on socio-economic inclusion.

SONAECOM takes the view that mandatory access constitutes the basis for the development of multiple alternative offers of services to end-customers, contributing to social well-being. In this respect, the operator advocates a regulatory framework which imposes functional separation and the respective regulation of access to the network, including bitstream offers, because it believes that it constitutes a simple to apply benchmark and provides the desired effects with respect to competition and efficiency. It adds that mandatory access to the network may, moreover, be tied to the definition of an indicator of market power in order to encourage operators to scale the investment ladder²⁶⁰.

In particular, SONAECOM notes that there has been a tendency for PTC to move the exchange loop to RUs, APs or street cabinets, thereby destabilizing the business plans of the RUO beneficiaries with the risk that, if conditions do not exist for the replication of FTTx networks, the level of competition may be significantly reduced. Therefore, it considers that it is essential that, in respect of situations of exchange closures or the significant reduction in the total number of customers associated with such exchanges, the bitstream is guaranteed. Otherwise, it considers that the areas which come to be identified as competitive will become, in the best of cases, areas of duopoly.

In view of this risk, and given the additional risk (which SONAECOM comments is already evident in practice) that PT embark on a practice of pricing below cost in competitive areas, subsidized by higher margins in areas that are gauged as being non-competitive²⁶¹, SONAECOM considers that as a consequence there is heightened need for a national analysis of this market.

VODAFONE accepts that, in advanced and mature regulated markets, in which there are factors potentially limiting contestability, there may be grounds for the need for segmentation of such markets, where it is considered that areas with very high levels of competition exist alongside other areas of the country with insufficient levels of contestability, whereby the regulation applicable to each of these areas will be distinct. VODAFONE, supported by data from OECD and ECTA, reports that the Portuguese retail market for fixed broadband access shows modest growth and development, having lost ground in the European comparison of penetration rates.

Given the reduced possibility of infrastructure being duplicated at national or local level in the context of NGA, VODAFONE considers that in assessing the existence or otherwise of competition and therefore SMP in the access market, it is crucial to analyze the conditions and alternatives with respect to wholesale offers existing in this market which demonstrate

²⁶⁰ According to SONAECOM, this linkage may even be redundant, since there are areas where investors take the view, individually, that there are advantages in having their own networks (even if they also commit themselves to the same type of obligation). That is, in the event that the option of differentiated regulation is taken, it will entail the risk of damaging competition in areas which, may eventually, have come to be classified as competitive.

²⁶¹ In particular, because it will have the incentive to increase the costs associated with wholesale offers in order to limit the margins of alternative operators in these areas.

whether a competitive market and low barriers to entry can be supported. Noting that only the network of copper and future NGA support wholesale solutions which can be regulated, VODAFONE does not consider that there are grounds for the geographical segmentation of the market and of obligations at wholesale level.

According to VODAFONE, any geographical segmentation of the regulatory obligations that apply to the incumbent operator in this market, embodied by a reduction of these obligations, would put the regulatory framework out of balance and favour this operator. The weakening of the conditions of competition in these regions would lead, according to VODAFONE, in the weakening of the alternative operators, and consequently, make it more difficult to achieve the size and scale needed to compete in other regions where they are also present, in a dynamic effect that can only drive the re-monopolization of the provision of fixed broadband services.

Question 28: What do you view as the implications of the regulatory measures proposed by the ERG in each one of the FTTCab and FTTH scenarios? What concrete measures do you propose for their implementation?

PT argues that the ERG proposes determined regulatory measures for the scenarios of FTTCab and FTTH because, in the majority of countries, the incumbent operators do not have an offer of access to conduits. Accordingly, PT takes the view that the measures only make sense where there are persistent horizontal barriers which are difficult to resolve in the short term, but do not make sense in Portugal, where they would be neither necessary nor proportionate. In PT's view, and as the ERG acknowledges, there are no "*one size fits all*" solutions and there are issues that are beyond PT's control (e.g. related to the authorisation of local authorities for the installation of larger sized street cabinets) which would be difficult to implement in practice.

In the case of FTTCab, PT identifies constraints at the level of local authorities for the installation of street cabinets for co-installation, economic and technical viability or viability in terms of timeframe, or installation of cabinets by the operators themselves. In the case of FTTH, PT states that the possibility of optical sub-loop unbundling depends strongly on the architectures (PON or point-to-point) to be used. According to PT, if the PONs provide a better balance between investment, maintenance costs, efficiency and the provision of innovative services, the question of optical loop unbundling is in itself difficult, by being complex and is still technically immature.

According to PT, the measures proposed by the ERG are excessive and disproportionate in the light of their objectives and the wholesale offers of existing infrastructure, particularly the RUO and RCAO (given that this service and the service of access to poles already supports FTTH and FTTCab scenarios for operators with their own infrastructure).

As far as COLT is concerned, the primary implication is a potential increase in costs in order to comply with the regulation proposed. However, to allow access to all existing infrastructure, considering them as access networks, COLT considers that the benefit is mutual: locations where investment was previously high, may become easier to access, requiring lower initial investment.

For the FTTCab scenario, ONI believes that access and co-installation in street cabinets may prove problematic due to limitations of space and issues of local authority licensing, indicating that this latter issue could be improved through the implementation of specific simpler and faster procedures for NGA licensing, if undertaken as a strategic goal for the country. In an FTTB scenario, unbundling at the entrance of the building may, according to ONI, prove problematic due to the need for permission from condominiums, which issue may also be overcome through the adoption of specific simpler and faster procedures for NGA authorization.

The implications cited by ZON of the regulatory measures proposed by the ERG in each of the scenarios mentioned are a result of the existence of more than one NGA in Portugal. According to ZON, where a single network model is not adopted, it is essential to ensure that regardless of the technological model followed, all the operators are guaranteed equal competitive conditions, whereby it considers structural separation and the sharing of new fibre optic facilities in telecom risers to be essential.

SONAECONOM agrees with the ERG view, alerting to the need to take account of the specific limitations faced by Portugal when applying these principles to the national reality. SONAECONOM underlines the importance of *backhaul* and dark fibre products, respectively, with respect to areas of FTTCab and FTTH. Cumulatively, and as a guarantee of compliance with these measures in a transparent manner and on the basis of equity of access, it reiterates that functional separation should be imposed.

Given the limited network bandwidth which it allows and the long-term return, VODAFONE considers that the FTTCab scenario should be discouraged in Portugal. This topology also presents a range of limitations, referenced in its response to question 19, which makes VODAFONE sceptical about the viability of the proposals submitted by the ERG. The definition of an obligation of co-installation in the street cabinets of PT would constitute, in VODAFONE's opinion, a constant focus of legal dispute and administrative delay resulting in the postponement, possibly for a prolonged period, of the possibility of alternative operators entering the market. The high number of street cabinets and the restrictions on access to space seen today, will not be compensated, according to Vodafone, by the extension of the old market 11 or with the possible imposition of a wholesale backhaul offer, whereby it considers that the unbundling of the sub-loop is not an effective solution to NGA access.

Regarding the FTTH scenarios, VODAFONE considers that the contribution of the RCAO in encouraging the duplication of access infrastructure, while conceptually useful, is, in practical terms, virtually nil, given the problems mentioned above. VODAFONE agrees that

the greatest barriers to the roll-out of an FTTH network resides in the cost of civil engineering and the cabling of buildings, as supported by the ERG and as set out in the consultation document. In this context, VODAFONE considers that the capacity to make these investments resides in entities which are large enough to derive advantages of scale, which precludes alternative operators from rolling out NGA of any relevant size and geographical coverage.

However, it is important to solidify the conditions by which access to the copper pair can occur, particularly at the entrance of buildings (FTTB) or at another point (FTTH), depending on the technology adopted (point-to-multipoint versus point-to-point).

Question 29:

What alternative measures should be considered?

According to PT, alternative measures are contained within the ERG document itself and centre on issues associated with barriers:

- Horizontal: taking the position that access to all conduits should be provided for and not just those of PT, given that asymmetric regulation cannot be justified; and
- vertical: supporting the guarantee of access to buildings according to terms of strict equality for all operators.

According to COLT, the solution adopted by OFCOM should be taken into account.

ONI takes the position that a wholesale network operator would be the best solution.

ZON, VODAFONE and SONAECOM do not believe that other measures should be considered besides those referenced in their responses to the previous question.

Position of ICP-ANACOM

PT states that in a scenario of NGA development starting from areas of higher population density, where the level of competition is high, its expectation is that it would progressively be released of existing regulatory obligations, and that there would be no imposition of new obligations of access (to fibre optic) in Market 4.

In this respect, it is argued by the alternative operators that the rationale and principle behind the imposition of obligations on the copper network are applicable to fibre optic access networks and that regulation should be neutral from a technological point of view²⁶². Furthermore, when a network of fibre optic access is installed in a certain location, the position taken by these operators is that it would not be economically viable to install another network in parallel, whereby it would be necessary to impose obligations on the dominant

²⁶² “Where the NGA is the property of the incumbent operator or even in a situation where NGA is run by a consortium to which obligations of access and the establishment of wholesale offers apply”.

operator to provide access to optical infrastructure. In parallel (or where the unbundling of fibre optic is not possible, e.g. in PON), they consider that there should be a bitstream offer.

The ERG, in its Common Position on the regulatory approach to NGA, argues that the principles underlying the current regulatory framework remain appropriate to enact given the development of NGA. In this respect, ICP-ANACOM recalls that the process of market analysis is an essential step, in accordance with the current regulatory framework, so that a regulator can impose, maintain, modify or withdraw any obligation on an entity with SMP in a given relevant market (as defined in the same analysis).

It adds that Market 4 is, by definition, broadly encompassing and technological neutral, whereby any physical transmission infrastructure, which supports broadband services, is part of the market. Moreover, in its analysis of markets 4 and 5 ICP-ANACOM explicitly included access supported over fibre optics in the relevant markets, in accordance with the comments submitted by the European Commission.

In the analysis of markets 4 and 5²⁶³, it was concluded that:

"Regarding the wholesale provision of broadband access it is considered that, due to different competitive conditions, there are grounds for the definition of two geographic markets:

5-C) Market for the supply of wholesale broadband access which covers the area covered by the exchange areas where there is at least one co-installed operator and where there is at least one operator of cable distribution networks and where the percentage of homes cabled by the main operator in the exchange area exceeds 60%.

5-NC) Market for supply of wholesale broadband access covering areas covered by the remaining attendance points of the national territory.

In the market for the supply of wholesale broadband access in "NC areas", it also considered that the companies of Grupo PT hold SMP, whereby they are able to act independently from the parties which "participate" in the relevant market. As regards the market for supply of wholesale broadband access in "areas C", it was concluded that no undertaking has SMP. (...) there is [therefore] a market (or a part of a previously defined market) in which it is appropriate to remove the obligations which were imposed on Grupo PT. This results from the increased competition that has benefited end-users, resulting from the development of the various wholesale offers as a result, at least in part, of the obligations that were imposed on the companies of Grupo PT in terms of wholesale services at the level of access to conduits, the LLU and the "Rede ADSL PT" offer. The development of effective competition constitutes in fact, one of the last objectives of the imposition of obligations in the markets".

²⁶³ See <http://www.anacom.pt/>.

Additionally, according to the ERG, it is expected that operators will use different solutions in the development of NGA depending on various parameters (e.g. the current network topology) and individual characteristics of each region (e.g. population density), whereby the "economics of NGA" may vary across different technologies and geographies, with no single solution for all cases. The existence of various technologies/solutions in different areas of a national territory may justify, according to the ERG, different competitive conditions and therefore the definition of geographic markets or geographical differentiation of obligations to be imposed.

In this regard, the Commission states, in the draft Recommendation, that there are several scenarios for the development of NGA (at least in the short and medium term, the roll-out of optical fibre in the access network will have limited geographical coverage) and different levels of competition can be expected in the different Member States. In addition, the European Commission notes that fibre optic will usually be installed in parallel to the copper access network of the operator with SMP, whereby these distinct factors may result in different levels of competition in infrastructure, which should be taken into account in any analysis carried out by regulators. The Commission concludes by noting that since the development of NGA is at an early stage, a degree of caution should be adopted when evaluating the level of competition in infrastructure²⁶⁴.

The draft Recommendation also notes that regulators should evaluate the need to define geographic markets, given the competitive conditions created, both nationally and regionally, by the gradual spread of NGA and the level of competition between network infrastructures²⁶⁵.

Additionally, ICP-ANACOM has stated that investment in NGA is likely to begin with the areas where operators are already offering their services and have customers, which areas are, in fact, more commercially appealing²⁶⁶.

²⁶⁴ Paragraph 3, page 3: *"There are a number of possible scenarios for future Next Generation Access (NGA) network roll-out, and competitive outcomes are likely to vary both between and within Member States. Fibre roll-out will, at least in the short and medium term, have limited geographic coverage. In addition, fibre will often be deployed in parallel with the copper circuits in the network of the Significant Market Power (SMP) operator ("overlay"). Geographic variations in network competition may be more pronounced as a result of these factors and should be incorporated in the NRA's analysis. Since network roll-out is only commencing, caution should be exercised in prejudging the extent of network competition"*.

²⁶⁵ para 3, page 5: *"NRAs should examine the need to define geographic markets taking into account the competitive conditions created at both a national and sub-national level by the progressive roll-out of NGA networks and the status of infrastructure competition"*.

²⁶⁶ Furthermore in the analysis of the "markets for the supply of wholesale network infrastructure access (physical) at a fixed location and wholesale supply of broadband access" it is already recognised that *"in terms of potential competition it should also be highlighted that the possibility of access to PTC's conduits provided by the respective reference offer facilitates the development of the network, including the fibre optic network, by the alternative operators. (...) Since they are large investment involving economies of scale, it is expected that they will concentrate, especially initially, in the area covered by the market in analysis since they roughly coincide with the major urban centres and coastal areas, areas of greater population concentration and economic activity"*.

Thus, it can be expected, at least in the medium term, that there is an affective geographical limit to the development of NGA and that this "segmentation" (results from and) leads to different competitive conditions.

In this context, and without prejudice to any future (market) analysis which may be conducted at the time when it is expected that developments in terms of NGA might start to have an "impact" on competitive conditions, it is now possible to formulate a non-intrusive approach, essentially focused on ensuring conditions of access to passive infrastructure which are non-discriminatory and transparent, particularly in terms of the RCAO.

With the possibility of access to passive infrastructure for the development of optical fibre closer to the customer and the offer of (new) services based on NGA, according to "equivalent" conditions, i.e., in line with the principles of equivalence, transparency and non-discrimination, any operator may, freely, invest in and develop its network and offer services. If, as is expected, investment is made in areas where there is already a greater competitive dynamic (currently in the provision of broadband access), ICP-ANACOM takes the position that in such circumstances, there may not be a dominant operator (at national/regional level) and therefore it would not be proportional to establish - at least from the beginning and in addition to obligations governing access to conduits - the "ex-ante" imposition of obligations of access, including unbundled access to fibre optics.

Obviously, in the event there are no conditions whereby competing operators may develop their network in a way which is "equivalent" to the incumbent operator, for example, due to lack of capacity in conduits, ICP-ANACOM takes the position that it can and should consider other solutions, including the imposition of specific obligations of access such as unbundled accesses to the optic loop or access to the virtual network. More specifically, in a scenario in which the incumbent operator develops a network based on FTTH, according to the draft Recommendation, the regulator should (only) impose additional obligations of access (access to dark fibre), in addition to access to passive infrastructure (including conduits), when the latter option is technically or physically impossible or in the event that it is not economically viable to have a sufficient number of operators in competition. In these circumstances, where an operator with SMP has installed a fibre optic network, the European Commission considers that there should be guaranteed access (to such fibre optic) at a concentration point where such access is economically feasible²⁶⁷.

It is noted that in the ERG's view, a view also taken by ICP-ANACOM, that the principle of promoting effective and sustainable competition at the infrastructure level remains appropriate, whereby the regulators will have to promote the suitability of the (wholesale)

²⁶⁷ Paragraph 15, page 7: "NRAs should impose further physical access obligations (access to unlit fibre) beyond access to ducts, other civil engineering works and other elements which are not active, where access to this infrastructure is technically or physically impossible or where it is not economically viable for a sufficient number of operators to ensure effective competition. In such circumstances, where the SMP operator has deployed a fibre network, access should be granted at the concentration point which allows access to unbundled fibres where it is economically viable".

products of access with respect to the hierarchy of the "ladder of investment" in NGA. However, where competitive conditions do not change with these developments, there is no occasion, *per se*, to change or withdraw the regulation of existing services. ICP-ANACOM recalls in this respect, and in particular, that "ex ante" obligations in Market 4 imposed on the operator with SMP in the access markets shall remain in force throughout the national territory, *ex-ante*, including the obligation of "access to and use of specific network resources"²⁶⁸.

In this context, in the area where (currently) there is less of a competitive dynamic, both in terms of network infrastructure and the provision of services, i.e., areas which are more remote and less populated, especially those where only the incumbent is present, the current requirements for access will be maintained, and furthermore there will not be any move made from the outset to exclude any obligations imposed with respect to access to the fibre-optic network, in order to achieve the aim of reconciling investment in NGA and promoting competition in the market.

However, it appears to be agreement that, in these areas it is unlikely that competition will exist at the level of optical infrastructure and that a point-to-multipoint (PON) solution developed by a single entity (regardless of which one) may be the most efficient and low cost way of geographically extending NGA. There also appears to be agreement that the unbundling of fibre optic in solutions of this type is technically complex, requiring that it be carried at the level of the last splitter, that is, already very close to the end-customer²⁶⁹. However, in this circumstance, any operator who wanted to (co)install at the level of the (last) splitters would also need to develop, by itself, an extensive fibre optic backhaul network (even though this could come to be guaranteed by a dark fibre offer²⁷⁰), accepting that it might not be technically and, above all, economically feasible to perform the unbundling of the optical (sub)loop in this situation.

In the meantime, regulatory intervention would be justified to ensure the existence of a (geographically) broad offer of services (based on NGA) and so promote info-inclusion, which may be established in the obligation to grant access to alternative operators through a bitstream offer, although restricted to specific less economically appealing areas.

ICP-ANACOM agrees that regulatory impositions should be considered and proportionate, in order to not discourage investment and always from the perspective of the interest of the end-user. However, it has the firm conviction that it has the obligation to pursue, in a balanced way, the objectives of regulation which are defined by law (specifically by article 5

²⁶⁸ In particular, "Access to local loops and sub-loops and related facilities (including co-installation in MDFs and in the street cabinets, transport signal)" and "Not withdraw access where already granted to determined resources."

²⁶⁹ In contrast to the unbundling in point-to-point networks, where the unbundling of the fibre can be carried out (as occurs with the unbundling of the copper loop), in theory, at a superior point of the network, at the level of the ODF, which may be in a local exchange.

²⁷⁰ See position on this subject in a later section.

of the LEC), whereby it is bound to ensure that the introduction and expansion of NGA will not result in the re-monopolization of the Portuguese electronic communications market. This is because it believes that objectives of the medium and long term - (i.e. "*to ensure that users (...) derive maximum benefit in terms of choice, price and quality*") - should not be sacrificed for more short-term objectives, related to the adoption of new technologies. Clarification is also made in this regard that a situation of duopoly is not sufficient accomplishment, in the view of ICP-ANACOM, of the cited objectives of regulation.

Certain operators argue that the definition of regional markets is not appropriate, as it may create an imbalance in the regulatory framework in favour of the incumbent operator and result in the weakening of the alternative operators, creating a regulatory framework which "*leads to two-speed development in the country*", according to SONAECOM. According to the view of this entity, only the functional separation of PT would give rise to offers throughout the national territory. Other entities that responded to the public consultation also reinforce the need to impose this separation.

ICP-ANACOM defined²⁷¹, in the context of the analysis of markets 4 and 5, two distinct geographic markets, given the developments occurring in the meantime in the broadband access market²⁷², which has demonstrated that different competitive conditions exist in different geographical areas, which justifies that the definition of the relevant geographic market in this case no longer corresponds to the national territory. In this case, the different dynamics of the market itself dictate the regulatory approach and not to the contrary. The current regulatory framework established that obligations may only be imposed (or maintained) in non-competitive markets on the entity or entities with SMP in these markets.

This issue is discussed in due detail in the same market analysis, which obtained the agreement of the Portuguese Competition Authority (Autoridade da Concorrência) and the European Commission. The position taken by ICP-ANACOM with respect to functional separation has been set out in the previous section.

In any case, ICP-ANACOM seeks and shall always seek to uphold the interests of the citizen, an objective of regulation enshrined in the law, promoting competition (particularly in terms of the optic network infrastructure and services) and ensuring this in no way deteriorates from current levels (in determined markets), further providing for info-inclusion, particularly in more remote areas, i.e., seeking that in the future any citizen, in "any part" of the national territory, may enjoy services supported by NGA.

²⁷¹ It is noted that, according to the European Commission Guidelines on market analysis and the assessment of significant market power under the Community regulatory framework for electronic communications networks and services, "*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*".

²⁷² With emphasis on the expansion of LLU (e.g., in terms of the number of unbundled access) and on the *spin-off* of ZON.

Regarding the implications of the measures advocated by the ERG for FTTCab and FTTH solutions, a number of potential problems in implementation are cited by various entities²⁷³.

ICP-ANACOM agrees with the statement that there is a no "*one size fits all*" solution, either at a technical level (in particular regarding the choice of topology by operators) or at the regulatory level, given the various problems and solutions highlighted. It does not fall to regulators to decide on the best technical solution(s) or structure(s) for NGA, but rather to seek to ensure that, from a regulatory point of view, any constraints on investment in the development of networks for all stakeholders are minimized, i.e., creating a "*level playing field*". It is for this reason that the ERG highlights the technical issues and issues of implementation, and why the broadening of the obligation of co-installation at (or in) street cabinets is considered, along with their connection, whereas, to this purpose, the additional obligation of access to conduits is envisaged. This requirement is considered crucial to the ERG, especially for FTTH/B scenarios, where the greatest barriers (to the development of NGA) is the cost of construction (horizontal barrier) and cabling in buildings (vertical barrier).

In the case of imposition of access to conduits, the ERG considers that an amendment of Article 12 of the Framework Directive would strengthen the powers of regulators to impose symmetrical regulation with respect to the sharing of infrastructure such as conduits or cabling inside buildings (i.e. the operators without SMP in the access markets).

The possibility of (unbundled) access to the fibre optic of the operator with SMP in relevant markets is also provided for in specific situations, both in the common position of the ERG on the proposed recommendation and in the analysis of Market 4. It is therefore an obligation of access which may be imposed by the regulator, especially in cases of technical impossibility or lack of economic viability of access to conduits or dark fibre, where deemed to be technical feasible²⁷⁴, suitable and proportional -- see above position of ICP-ANACOM on this issue. If necessary, depending on the solution(s) on the ground, a more detailed analysis may be conducted of the conditions under which access to the local loop may occur, particularly at the entrance of the building, with the copper loop - FTTB - or, in FTTH architecture, with the fibre optic loop, depending in this respect on the topology adopted (point-to-multipoint versus point-to-point).

²⁷³ Such as:

- potential increase in costs to comply with the proposed regulation;
- limitations of space and issues of local authority licensing with respect to access and co-installation in street cabinets;
- need for condominium permissions for unbundling in the entrance of the building in an FTTB scenario;
- the need for backhaul and dark fibre products, respectively, within areas of FTTCab and FTTH;
- severe limitation in an FTTCab scenario, particularly given the inefficiency of the unbundling of the local sub-loop;
- barriers in terms of the cost of civil engineering (basic infrastructure and installation of fibre) and the cabling of buildings (investments with advantages of scale).

²⁷⁴ The ERG also recognizes that in the case of PON, unbundling may constitute a much more complex challenge at a technical level.

The ERG also identifies a number of regulatory challenges and obligations with respect to FTTCab scenarios: (i) the unbundling of the (sub) loop at street cabinet level, in which there are major constraints to co-installation and connection to the networks of the operators, (ii) the imposition of the offer of complementary products such as backhaul services over the distribution network (between the street cabinet and the node of the operator's network) or (iii) access to conduits.

In this respect, the cited draft Recommendation sets out the steps that the Commission considers that regulators should take in an FTTCab scenario, such as ensuring that the street cabinet allow access by alternative operators and that all ancillary services (e.g. power supply) necessary for such access are available in the reference offer²⁷⁵.

2.2.10 The role of the State and the regulator

Question 30: Do you consider that current initiatives to encourage investment in networks are sufficient? What other regulatory initiatives or initiative of the State do you consider may create further incentive to the development of NGA, promoting greater territorial coverage and info-inclusion?

According to PT, a clear, stable and transparent regulatory framework is required to allow operators to make informed and timely investment decisions, which are uninhibited by an intrusive regulatory framework.

PT considers that the initiatives of the State should be limited to inducing the supply, with the State taking the position of "massive acquirer", of very high speed services (e.g. future connection of all public schools and hospitals to networks of the next generation²⁷⁶). Accordingly, PT considers that Government initiatives conducive to the promotion of mass take-up of high-speed access to the Internet and development of advanced applications, with the goal of connecting 1 million users to NGA by 2010, and also by public entities, promote investment in NGA and are able to promote greater territorial coverage (and consequent promotion of info-inclusion and the narrowing of the "digital divide"), whereas PT recognises that (this is a difficult issue because) the low return on investment in remote areas, combined with high costs, constitutes a large obstacle to the development of NGA in these areas.

PT also considers that the projects being promoted by UMIC to bring broadband to remote areas (Community Networks and Digital Cities) are also positive, although it does not believe that such projects can solve the problem in all areas the country. Notwithstanding these measures, PT proposes the adoption of incentives for investment in remote areas such as:

²⁷⁵ Paragraph 10, page 4: "NRAs should ensure that the street cabinet itself facilitates competitive access and that all necessary ancillary services (e.g. power supply) are available in the reference offer with appropriate pricing provisions. Sub-loop unbundling together with backhaul products should also be adequately specified in revised reference offers to allow continuity of existing competitive offerings".

²⁷⁶ Included in Resolution of Council of Ministers no 120/2008 of 30 July.

- provision of tax breaks for operators who make this choice; or
- guarantee of a minimum level of profitability, by making long-term contracts with the first operator to bring the NGA to a determined remote area.

In a wider context, it views as positive the adoption of legislative measures which aim at the mitigation of the horizontal and vertical barriers to the development of NGA.

According to ALCATEL-LUCENT, each national strategy is specific and reflects local conditions. This is despite the fact that, in their view, private investment²⁷⁷ will begin in high density urban centres and it will only be possible to resolve the new "digital divide" with government partnerships and interventions. ALCATEL-LUCENT reported that it had contributed have with four initiatives in several countries, recommending:

- The launch of a national NGA forum, with the cooperation of the Government, regulator, operators and consumers being a critical factor for success, which should result in research, recommendations, opinions and consensus.
- The definition of a national strategy for very high speed connections, with the development of focused and targeted strategies, taking into account relevant local factors (competition, involvement of municipalities and utilities etc.) and making an assessment on a case-by-case basis as to the best type of access (optical fibre, wireless, etc.).
- The translation of a strategy into a political²⁷⁸ and regulatory agenda²⁷⁹ because, according to ALCATEL-LUCENT, private investment will only take place where there is political and regulatory clarity (allowing the clear assessment of risk).
- The determination of savings targets with respect to passive infrastructure, given that the potential savings in infrastructure costs requires detailed planning and close coordination for engineering optimization, sharing of resources and promotion of synergies; this should be done at local/regional level (possibly in conjunction with local providers of "open access passive" infrastructure).

²⁷⁷ The civil engineering costs of passive access determine where and when the fibre is extended, with the cost of opening trenches and conduits constituting 60% of the increase in CAPEX in FTTH (plus 10% for the dark fibre), given that this access (the conduits) is regulated in Portugal. Equally high is the variation of such CAPEX according to the demographics ranging from between 1,000 and 6,500 euros per connected subscriber, according to ALCATEL-LUCENT.

²⁷⁸ According to ALCATEL-LUCENT, local/regional authorities are capable of transforming themselves into drivers of a "Fibre optic nation", for example, with programmes which raise awareness and provide motivation, development plans, establishment of rights of way and allowing the sharing of passive infrastructure.

²⁷⁹ According to ALCATEL-LUCENT, regulators have the power to determine the definition of "competition", the amount of infrastructure, access to conduits, as well as access to buildings and may also provide guidelines for possible public-private partnerships which seek to eliminate the digital divide. These interventions should, according to the manufacturer, be intergrated in the framework of the Government's legislative initiatives (eg cabling in buildings).

FCCN considers it important that the state assumes part of the cost arising from the insularity of the autonomous regions, as well as the work of creating a register of conduits and fibre optic resources installed by different entities, providing these same resources according to equal conditions and at cost price to all operators. FCCN indicates that this registration should involve central, regional and local powers.

As far as COLT is concerned priority should be given to developing an NGA topology based on point-to-point, further preserving the principles of the investment ladder and ensuring the maintenance of LLU.

ONI takes the view that the current measures of encouraging investment in networks are insufficient, suggesting as a possible additional measures:

- Streamlining and simplifying all processes related to local authority licensing and permits for installation in private buildings which, without jeopardizing reasonable public or private interests, allow the faster installation of new infrastructure.
- Imposing obligations of access on entities which have infrastructure.

ZON highlights the initiatives of the Knowledge Society Operational Programme (POSC - Programa Operacional Sociedade do Conhecimento)²⁸⁰. However, it considers that such projects still have limited scope and are also limited primarily to investments in the *core* network. In addition to reiterating the proposals for a single network model or structural separation of the wholesale business of PTC, ZON comments, along with issues relating to the ITED regime and its extension to old buildings, that the State could create a tax system which is more beneficial to operators which are connected to the single network and which invest in creating new services and features to be made available over NGA.

SONAECOM reports that, in principle, it is not in favour of public funding, considering that priority should be given to the creation of conditions which are conducive to private investment. This entails, according to the operator, the implementation of regulatory and legislative measures, such as amendment to ITED, the standardisation and simplification of municipal regulations governing the installation of infrastructure in the soil and subsoil, the amendment of the regulation of MFRW²⁸¹ and finally, clarification of the regime governing the ownership and management of conduits installed by property developers, in order to eliminate the current bias in favour of PT.

SONAECOM argues that only after the results of these measures have been examined on the ground should forms of public financial support be considered, which support should always be based on the open network concept and the principle of granting support through

²⁸⁰ Co-financing of open networks allowing access, according to conditions of equality and non-discrimination and based on a reference offer, to operators for the support of their offers of publically available electronic communications services ("Community networks") in less developed areas of the country.

²⁸¹ Thereby, according to SONAECOM, eliminating uncertainties which persist on the possibility of double taxation advocated by municipalities, and encouraging the construction of fibre optic networks.

open, transparent and competitive procedures (e.g. public tender). Following this methodology, SONAECOM believes that conditions will be created for the development of competition in the market, while the potential impacts which public financing systems may have on the competitive dynamic is minimised.

According to the position taken by VODAFONE, the combat of info-exclusion and the construction of a knowledge and information society should be carried out through the promotion of investment in research and services at the expense of investment in construction of duplicated passive infrastructure. According to VODAFONE, the construction of NGA with reduced investment and operating costs should be goal in itself, driving down wholesale costs and enabling the creation of attractively priced retail proposals and the consequent widespread sign-up of customers. Therefore, VODAFONE considers that, as set out in its response to question 22, the regulatory and State initiatives for network investment should focus on the creation of a single network.

Question 31: Do you consider that the networks promoted using public funds should operate as open networks, exclusively enabling the provision of electronic communications services by third parties or, conversely, should be used without restrictions as a form of promoting further competition?

PT considers that any networks promoted using public funds should, firstly, strictly observe the rules laid down in the Commission document entitled "State aid assessment of public funding broadband"²⁸² and should only be developed in areas where private initiative has not occurred or will not occur, otherwise there is a risk of creating barriers to the entry of efficient operators.

On the other hand, PT argues that these networks should function as open networks and not as a way of promoting additional competition, constituting investments in areas where private investment is not viable.

ALCATEL-LUCENT refers to the response given to question 16.

FCCN believes that networks promoted using public funds should operate as open networks and exclusively as enablers of the provision of electronic communications services by third parties. In this respect it also indicates the need to find a business model for the operation of these networks by the promoter and prevent concession to a single operator with the aim of obtaining short-term gain²⁸³. FCCN judges that public investment in these situations must seek return over the medium-term for the region and not immediate return for the promoting body.

²⁸² Which clarifies the criteria for the use of structural funds, as well as the application of the rules on State aid for such projects. See:

http://ec.europa.eu/information_society/istevent/broadband_gap_2007/cf/document.cfm?doc_id=4452.

²⁸³ FCCN proposes that for this purpose account be taken of best international best practice.

According to COLT, the existence of healthy competition can only exist if the networks promoted using public funds are accessed in the same way by all operators. This equality needs to be guided by the principles of transparency and healthy competition.

According to ONI, the networks promoted with public funds should operate as open networks, over which operators are able, in respect of reasonable payment for use, provide their services.

According to ZON, networks promoted using public funds should be open, considering that they should form part of the single network model (which it proposes), contributing to greater geographic coverage from its launch.

This question was answered by SONAECOM in conjunction with its response to question 30.

VODAFONE also argues that, as the best option for the country and to achieve the objectives of the information and knowledge society, networks and public, municipal and state infrastructure, promoted with the use of public funds, should make up a single NGA dedicated solely to the provision of wholesale services and open to all third parties which will use it to compete by building their offer of services.

Question 32: In this regard, how can proper incentive for investment and innovation be ensured, while promoting competition, without distortion, and without calling into question the sustainability of the operators who have invested in the development of their networks and in LLU?

Citing OFCOM and the previously mentioned resolution of the Council of Ministers, PT again argues that an important incentive for proper investment and innovation in NGA would be provided by the timely adoption of a clear, transparent and proportionate regulatory framework.

According to PT, given that the objective of regulation is to protect competition to the benefit of consumers and not to protect competitors, incentives for investment and innovation should not be sacrificed on the basis of a fear that investment in NGA could put the sustainability of beneficiary operators of LLU into question. Instead, PT argues that, with competition based on own infrastructure being more successful and sustainable, the regulatory framework should encourage operators who have invested in developing their own networks in LLU to move up the investment ladder by developing their own NGA, at least in certain areas.

Accordingly, PT considers that the best way to reconcile two seemingly contradictory objectives - to encourage investment and innovation without jeopardizing the sustainability of the operators who have invested in LLU - is to focus regulatory efforts on removing obstacles which still result from the market power in the historic network, maintaining a

permanent "*level playing field*" on a non-discriminatory basis, enabling all operators to invest in NGA. In this context, PT considers that the RCAO is a suitable regulatory instrument for ensuring the objectives in question, notwithstanding any improvements which may be enacted.

ALCATEL-LUCENT refers to the response it gave to questions 11 to 14.

FCCN judges that the intervention of State funds should be limited to passive infrastructure and less dependent on technological developments (conduits, cables, interconnecting rooms or poles), to reduce the costs and complexity of operation, to facilitate their use by various operators and promote competition and innovation.

COLT considers that there should be a healthy debate between all operators on the development of the access network.

According to ONI, it is essential to ensure that the assumptions that led operators to invest in LLU are upheld. Accordingly, it proposes that exchanges where there are co-installed operators with significant numbers of unbundled loops are kept active. Any decommissioning of exchanges should, according to ONI, be carried out according to an appropriate timeframe and guaranteeing the assumptions which gave basis to the business plans of operators. More specifically, it argues that the costs incurred by co-installed operators should not increase as a result of any increase in PTC's costs of operating this infrastructure. In cases where the number of unbundled loops does not economically justify the maintaining operation of the exchange, ONI suggests creating favourable conditions for the migration of these operators to street cabinets (with, for example, the costs of migration supported by the incumbent, as decided in the Netherlands).

ONI supports the imposition on the dominant operator of obligations of co-installation, offer of backhaul and unbundling of terminal loops. Investment incentives may take the shape of a guarantee of fair return to the dominant operator (typically the first-mover in each area) for the use of its network resources by co-installed operators. And, possibly, include additional tax benefits where networks are rolled-out in less profitable areas.

Ensuring proper incentive for investment, innovation and promotion of competition is embodied, according to ZON, by the adoption of an effective and stable (predictable) regulatory framework and the adoption of a single network model with the inherent resolution of the problem access to conduits. This model will likewise enable the sustainability of operators which invested in their own network and in LLU, in that it will provide for the progressive migration of services.

This question was answered by SONAECOM in conjunction with its response to question 30.

VODAFONE also takes the view that the existence of transparent and non discriminatory conditions in a transparent and stable regulatory framework constitutes the major incentive for competition between the undertakings which operate in the market for the provision of services. The proper incentive for investment and innovation, while promoting competition in

this market, is embodied, according to VODAFONE, in the guarantee of open network principles throughout the territory and that the reference and wholesale offers evolve, according to the principle of the technological neutrality of regulation and strengthen, with the necessary technological differences, in a market where there will be NGA and services available on it.

Question 33: Do you see that there are constraints in access to basic support infrastructure, including from entities other than operators of communications networks? What constraints? Can you recommend measures to overcome them?

PT states that for a number of years it has been making use of infrastructure contracted²⁸⁴ from national providers other than telecommunications operators²⁸⁵, according to protocols defined under terms of partnership.

However, PT submits that there are important constraints in access to basic support infrastructure covered by the second part of Article 26 of the LEC and by the regime set out by Decree-Law no 68/2005 of 15 March, which legislation it considers may constitute appropriate instruments in respect of the housing of electronic communications networks (and an important driver of the mass roll-out of broadband) in a vast expansion of conduits belonging to a wide range of entities (concessionaires of the state, utilities, etc.). The lack of success in applying this legislation is a result, in the view of PT, above all of shortcomings in the latter piece of legislation and lack of articulation between the two²⁸⁶. Furthermore, PT believes that the same law fails to establish a clear legal regime of integration in the public domain of conduits belonging to the entities covered by its field of application (which it also cites as being unclear).

PT proposes an overhaul of the regime established by said Decree-Law, instilling clarification and establishing the following rules:

- Indexation of the invoicing date to the effective commencement of enjoyment of access²⁸⁷.
- Alignment of pricing to cost, whenever the infrastructure is in possession of an operator, enabling equal access to infrastructure by all competitors.

²⁸⁴ Network of conduits, manholes, dark fibre joints, *housing*.

²⁸⁵ ANA, BRISA, Estradas de Portugal, EPAL, Lusoponte, Refer, REN.

²⁸⁶ As an example, PT states that Article 26 of the LEC confers on all concessionaires the State the right remuneration in respect of the use of space in their conduits, a right which is denied by said Decree-Law No. 68/2005, thereby creating a situation of uncertainty and conflict which is ultimately damaging to the accomplishment of the desired objective.

²⁸⁷ Since the licensing procedures result in an administrative action on an existing and available resource.

According to PT, constraints on access to conduits of new urban developments should be prevented, alerting to the need for symmetry in access to these sections of infrastructure and according to conditions which are identical to those defined in the RCAO.

According to ALCATEL-LUCENT, it should be possible to have access to the basic infrastructure of external entities (utilities, transport, public sector), maximizing their use and avoiding unnecessary investment, particularly in areas of low population density. Local authorities should compile an inventory of national infrastructure, which will rationalise the use of the passive infrastructure, providing for cost savings in the roll-out of NGA, and will maximize synergies in passive FTTH infrastructure. The manufacturer identifies, however, challenges such as the consolidation of asset databases, promotion of joint work of the public and private sectors and identification of the total costs.

Similarly, according to ALCATEL-LUCENT, the government should legislate to define a clear set of rules, including on access to public funds, as well as review the rules relating to rights of way.

FCCN considers that the established regulatory framework should cover all entities operating relevant infrastructure, regardless of the nature of their business.

COLT considers that the best option would be to individually identify every one of the constraints which may arise.

Since a significant part of the cost of installation of NGA is incurred in the construction of infrastructure, ONI views the use of existing infrastructure with the technical capability to support communications networks with great interest. However, it considers that access to this type of infrastructure is always dependent on the willingness of the owner entity and is subject to negotiations on a case-by-case basis, whereby it proposes the imposition of access on entities in possession of such infrastructure. According to ONI, the conditions of use must be defined so as to ensure a fair payment for use of property, which often, is public and part of a concession.

ZON takes the position that, in fact, there are constraints on access to basic support infrastructure. The first constraint identified by ZON is the lack of certainty about the possibility of using this infrastructure from a technical point of view (due to demanding conditions or even, for reasons of security). The second constraint is the lack of a legal/administrative framework for access to such infrastructure and finally, the lack of record information.

ZON notes that along with others, such as IEP, the entities which provide public services such as water, sewerage and gas services could conduct a survey in some urban areas to verify the feasibility of using these infrastructures. In the event that some are suited to use, the possibility could be raised of their rental (which also provide revenue to meet the costs associated with carrying out the survey), in the image of IEP.

SONAECOM takes the view that it is important to demystify the role that the infrastructure of these organizations can play. In their current state of development, SONAECOM considers that it is unlikely that this infrastructure can offer a response to market needs, especially as regards the access network, since they lack conditions (technically or in terms of space or capillarity) which would enable them to serve as a real alternative to the network of conduits managed by PTC²⁸⁸. For SONAECOM, the conduits between the current exchanges of PTC and between the houses or premises of end-customers (local access segment) are the only ones designed and planned for the installation of communications networks (such as future NGA), and are equipped with the necessary capillarity and technical characteristics²⁸⁹. Therefore, it is clear that the intended removal of barriers that currently constrain access to conduits should focus, primarily if not exclusively, on the underground conduits, manholes and poles which are installed in existing electronic communications networks.

Meanwhile, SONAECOM reiterates that the importance of access to conduits primarily centres on two aspects:

- effective access; and
- subjecting the holder of the conduits to exactly the same procedures (including with respect to obtaining information about free space in conduits, equipping them and removing blockages) as are imposed on the beneficiaries of access.

To this extent, SONAECOM alerts the regulator to the danger of overestimating the real significance of alternative conduits owned by utilities, which could create an expectation that will never be delivered. Such infrastructure may serve as a complement in certain areas to the distribution networks of the operators but never as a replacement to the conduits under the management of PTC in respect of the construction of NGA.

VODAFONE also identifies several constraints in access to basic support infrastructure belonging to entities which are not operators of communications networks. In particular, access to the infrastructure of such entities is current effected according to the request for information and negotiation on a case by case basis with each entity, while they are no commonly defined general rules and procedures for access.

This situation may, in the opinion of VODAFONE, be overcome with the existence of a source of information updated in real time containing all the information (availability and occupied and available capacity) of different entities that have (or manage the infrastructure

²⁸⁸ According to SONAECOM it is not possible to say that the conduits designed for the electricity distribution or water supply and sewerage networks offer the same ubiquity with the technical characteristics necessary for the installation of tubes and/or telecommunications cables.

²⁸⁹ For SONAECOM, in question are specific conduits for communication networks, corresponding in fact, to the current planning regime which requires developers of housing estates (and other urban operations) to build the telecommunications infrastructure in addition to those built for other utilities.

of) networks and basic support infrastructure²⁹⁰, which could serve the various operators of electronic communications, pursuant to the legal regime set out in Decree-Law no 68/2005 of 15 March

Question 34: Do you view it as opportune to consider amendment of the system of municipal fees for rights of way, and if so in what way?

PT considers it opportune to review the basis of the MFRW system in order to clearly define the following aspects of MFRW:

- its nature²⁹¹;
- objective incidence²⁹²;
- the subjective incidence²⁹³;
- the basis for the calculation of and rate of MFRW²⁹⁴; and
- procedures for billing and delivery²⁹⁵.

ALCATEL-LUCENT argues that to promote the roll-out of NGA, MFRW must be revised downwards.

COLT considers that the current MFRW system is outdated in the face of reality, whereby the regulator should recommend an approach which would allow its proper amendment, resulting in a closer link between operators and local government

²⁹⁰ That is, under the direct or indirect administration of the State and other legal persons of public law with jurisdiction over the public domain of the State, including over road, rail, ports, airports, water supply and sewerage and the distribution of gas and electricity.

²⁹¹ According to PT, it must be stipulated that, as part of the respective activity, the operators should only be required to pay MFRW, significantly reducing the differences between operators and local authorities.

²⁹² There need to be clarification, in the opinion of PT, as to the definition of services covered by MFRW, municipal taxes which should not coexist/be combined with other municipal fees which are levied with respect to these situations, particularly fees for the occupation of public space or municipal fees for the installation of infrastructure in the public domain. That is, even in municipalities that choose not to charge MFRW.

²⁹³ PT considers that it is essential to clearly identify the taxing bodies (municipalities) and taxpayers (end-customers and companies which offer networks and services, of the public and private municipal domain, with respect to tax adjustments) of MFRW (see Article 18 of the General Tax Law (Lei Geral Tributária)).

²⁹⁴ In view of the fact that MFRW is a tax for which the taxing bodies are local authorities, PT advocates the need to adjust it the new General Regime of Local Authority Fees (RTL - Regime Geral de Taxas das Autarquias Locais), approved by Law no 53-E/2006 of 29 December. It is also important to instil discipline and to streamline the procedures for setting the value of the fees by the municipalities and its disclosure and notification to businesses (notification by the municipalities or, alternatively, the centralization of management in a single entity not supported by the regulator nor, as a consequence, by the operators).

²⁹⁵ According to PT, is also necessary to instil discipline and to streamline the procedures for the collection and delivery of MFRW, as set out in Regulation no 38/2004, in particular by eliminating some unnecessary provisions, such as the obligation of providing information about the deployment, the passage and the crossing of resources in the public or private municipal domains, and considering the costs associated with procedures such as adaptation of invoicing databases and information systems and the obligation to carry out annual audits, among others, identifying how and who should bear such costs.

The current model is, according to ONI, complex and difficult to implement, constituting a barrier to the development of electronic communications networks within the national territory. As such, ONI supports the amendment of the scheme to reflect the benefits that an advanced communications network would bring to the municipality, whereas the opportunity should be taken to simplify and eliminate multiple municipal regulations on this issue in favour of a unified system at national level.

Despite the creation of MFRW having as an essential objective in the promotion and harmonization of fees for occupancy of the public domain, ZON consider that this objective is not being achieved, given that the current system is disparate and difficult to apply, resulting in greater difficulties for operators in the exercise of their activity. According to ZON, the application of MFRW has not been harmonious, with differences in the exercise thereof between municipalities, giving rise to different fees and conditions (there are even cases of municipalities that do not charge the fee, in order to avoid its impact on the consumer).

Furthermore, ZON believes that there are grounds for a system of reduction or even exemption from MFRW for certain less developed or remote areas of the country as a way of encouraging the roll-out of NGA, provided that this was compatible with European legislation on state aid. This option carries advantages for the municipalities which, while giving up some revenue, would receive a benefit which is clearly superior to that loss with the increase of the bandwidth provided by NGA, enabling widespread access to residential and business users to innovative and higher quality services.

In this context, ZON expresses concern regarding the lack of a uniform procedure, which is quick and non-discriminatory, with respect to the use of the municipal public domain for the purposes of implementing of communications. With a view to facilitating the possibility of access of local operators to the municipal public domain, ZON proposes an amendment to Decree-Law no 68/2005 of 15 March, with the aim of extending the rules contained therein to municipalities and other legal persons with jurisdiction over the municipal public domain, including municipal public companies.

SONAECON considers that the current consultation could be the ideal time to revive discussion on amendments to MFRW, referring to the position set out by APRITEL with respect to the amendment to the Regulation and already communicated to the regulator. It only considers it relevant to recall that the new MFRW Regulation should reflect the exemption scheme which it advocates for NGA and to grant exemption to operators which invest in these networks from the payment of any fees associated with use of municipal soil and subsoil.

In view of the fact that NGA is a public project and a key policy priority for the socio-economic development of the country, VODAFONE argues that, in terms of TMDP, there should be an exemption scheme for those operators who carry out significant investments in innovative networks. According to this operator, this is a measure which, by promoting and stimulating the development of alternative networks, will contribute to making access to the

majority of consumers to technologically innovative products and services a viable proposition.

In the event that this policy option is not selected, VODAFONE takes the position that it is crucial to reduce costs associated with the construction of networks (fees for use of the municipal subsoil) and the urgent harmonization of the multiple schemes set out in Municipal Regulations, the majority of which inflict excessively burdensome costs and procedures on operators. This is in addition, according to VODAFONE, to the fact that it is impossible, from a legal point of view, for various municipal fees to co-exist and derive remuneration from the occupation of the same infrastructure, given the need to avoid situations of double taxation.

Question 35: Do you identify particular problems in rolling out NGA in the Autonomous Regions of Azores and Madeira? If so, what problems do you identify and how can they be best overcome?

PT takes the position that there is a potential for competition between the operators involved in the autonomous regions with respect to the provision of access and broadband services and for the roll-out of NGA, both via an HFC platform and FTTx platform, respecting the principles of neutrality in terms of technology and network access, as well as quality of service, emergency communications and network security. In this respect, PT states that the autonomous regions of Azores and Madeira are the areas of the country with the most extensive (with a high level of capillarity) cable network (in addition to the copper network), not neglecting other platforms which are adaptable to the constraints of the island areas (which, by their makeup, are equivalent to remote zones with access difficulties). According to the position taken by PT, the focus in these region should not be on the presence of a lot of operators, but rather on the creation of conditions for operators to invest in NGA and offer increasingly higher quality services to the resident population.

According to ALCATEL-LUCENT, the autonomous regions are not preferred investment targets due to their location and the population density (greater investment and period of return), suggesting the intervention of the Government of the Republic and the regional governments (e.g. through PPP) to prevent a new and perhaps deeper digital divide.

CEGEA refers to its reply to question 27.

ERICSSON takes the view that the widespread development of NGA is dependent on the business model, but considers that for the Autonomous Regions an additional item, which must be considered in this model, is the availability of links (capacity) with the mainland.

RGA believes that a key problem in implementing NGA in the Autonomous Region of the Azores stems from the link with the mainland. In this regard, it comments that the optic fibre ring which supports this connection remains the property of PT, whereby only this operator can make investment decisions with respect to NGA. According to RGA, one of the ways by

which this constraint could be overcome, would be by increasing the speed of the ring, with the respective costs distributed among the operators interested in developing services in the Region.

FCCN also mentions that the specific problems in the autonomous regions are above all related to interconnection with the other regions of the nation. FCCN also comments that in this aspect there may be a position of greater dominance, which could justify regulatory targets and deadlines which are more in line with this reality.

Given the small size and dispersion of these markets, ONI foresees great difficulties in deriving return from NGA in these autonomous regions. Such investments can only be properly made, according to this operator, according to the provision of incentives to operators which decide to make such investments or a specific entity which installs and operates the network and makes it available to operators interested in providing services.

According to ZON the problems identified in implementing NGA in the autonomous regions are largely similar to those identified in the mainland territory, particularly in terms of the RCAO. Additionally, ZON states that the issues associated with connections through submarine cables between these regions and the mainland, particularly its control by PT, the difficulties associated with the capacity available in these links and the lack of transparency in their management, operation and maintenance, makes the roll-out of NGA in these regions difficult and extremely complex, contributing to info-exclusion.

In addition to problems specific to areas of lower population density and reduced vertical construction, SONAECOM just highlights the problem of the capacity restrictions of the submarine cables linking the islands to the Mainland and therefore, considers it a bottleneck in the development of NGA in these Regions.

According to VODAFONE, the implementation of NGA in the autonomous regions will suffer severely from the economic and infrastructure limitations which today affect the offer of services supported by LLU to the residents of both archipelagos. From an economic standpoint, VODAFONE states that it does not yet know the price at which PT will rent determined capacity to VODAFONE, and therefore, without this information, it will be impossible to prepare an economic analysis that reasons LLU investment in these regions²⁹⁶.

In terms of infrastructure VODAFONE states that the available capacity of the network to connect from the islands to the mainland has been a PT monopoly since March 2007, and that PT has been limiting the number of requests for expansion, citing the exhaustion of existing capacity and the need to invest in this expansion. The higher bandwidths resulting from the use of services offered using NGA will, according to VODAFONE, exacerbate the issue of access between the mainland and islands.

²⁹⁶ In this context, VODAFONE reports that it had to postpone the decision to offer services in these regions by over a year.

Finally, and in particular in the Azores archipelago, VODAFONE comments that the low population density of the villages scattered over several islands, makes the feasibility of rolling out NGA particularly challenging. Accordingly, noting that it is politically unacceptable that citizens of these outlying regions, in line with others in the interior of the mainland, are excluded from the Information and Knowledge Society, whereby VODAFONE submits that, particularly in the Azores and Madeira, only a single network will create the conditions for the existence of competition and combat info-exclusion.

Position of ICP-ANACOM

ICP-ANACOM agrees with the position taken by several entities that, from the outset, the adoption of a predictable, effective and stable regulatory framework for NGA is an incentive for investment and innovation.

The objectives of regulation, enshrined in Article 5 of the LEC are to promote competition and uphold the interest of the citizen, whereby it is incumbent on ICP-ANACOM, in particular, *"to ensure that users (...) derive maximum benefit in terms of choice, price and quality"*. In this respect, ICP-ANACOM has sought to ensure "non-discrimination in the provision of products and services" at the wholesale and retail level, including through the promotion of access to comprehensive networks so that operators can offer the same services with the widest possible coverage and promote info-inclusion.

However, demand, investment and provision of services have been, are and are expected to remain higher in urban areas with higher population density and greater purchasing power (and location of corporate customers), areas where operators normally obtain, a greater and faster return on their investment.

ICP-ANACOM is charged, also under Article 5 of this Law, with *"adopting all reasonable and proportionate measures which are necessary to ensure that any undertaking is able to provide electronic communications services or to establish, extend or provide electronic communications networks"*, i.e. this Authority is charged, in its narrow remit of action, as already mentioned several times in this document, with minimising any barriers to investment in networks and the provision of services, including its extension to the more remote areas, but this possibility of intervention is obviously limited. Ultimately it falls to the operators to take informed decisions as to whether or not to advance (and on what terms) with this extension, given the legal, regulatory, technical and economic constraints.

Meanwhile, according to the same Law (and article), *"Every public entity and authority shall, within the scope of its respective remit, likewise contribute to achieving the objectives of electronic communications regulation"*.

ICP-ANACOM takes the position, which is supported by the entities that responded to the public consultation, that the promotion of investment in NGA in less favoured or remote areas may also be achieved through legislative changes and/or through the action of public authorities, both in terms of ensuring easier access (e.g. with simpler and harmonized local

authority procedures) and non-discrimination in terms of access to basic support infrastructure to networks (including infrastructure installed in the public domain of the State), and with the direct intervention the State (e.g. through subsidies or participation in public-private partnerships, tax benefits or access to credit lines²⁹⁷).

There are provisions in the LEC which have the aim of enabling access to the public domain (article 24) and the sharing of locations and resources, regardless of whether they are owned by companies offering electronic communications networks or services (article 25. paragraph 2) and non-discrimination in access to conduits, poles or facilities of undertakings subject to tutelage, supervision or oversight of entities of the State, the Autonomous Regions or local authorities which pursue administrative functions, whether or not commercial by nature, including public undertakings, majority public-owned undertakings, or concessionaires (article 26, 5 *et seq.*), which may encompass the municipal domain.

The entities that responded to the public consultation present several proposals which in their view may promote investment and greater geographical coverage of NGA, including:

- "Indirect" initiatives of the State: including through the stimulation of demand for higher speed services (e.g. future connection of all schools and public hospitals to NGA) and development of advanced applications or initiatives such as POSC; strategic policy initiatives such as the launch of a national NGA forum; and the establishment of a national strategy for very high speed connection, with a guiding strategic vision.
- "Direct" initiatives of the State: including through investment incentives, such as tax benefits to operators which develop NGA in remote areas (or create new services and features to be provided over NGA); long-term contracts to bring NGA to a particular area - partnerships (PPP) and direct intervention (e.g. the projects promoted by UMIC - Community Networks and Digital Cities); and the assumption of the cost of compiling records of conduit networks and fibre optic resources installed by the various public bodies.
- Legislative (and/or administrative) initiatives of the State: including the streamlining and simplification of procedures applicable to network operators and related to local authority licensing and permits for installation in private buildings or for intervention in local authority soil and subsoil; in addition to the procedural aspect, the revision of fees (including MFRW); imposition of obligations of access to existing infrastructure to entities in possession of such infrastructure; modification of the ITED regime and clarification of the regime governing ownership and management of conduits installed by property developers.

It is noted that the Council of Ministers, in its resolution, decided:

²⁹⁷ In this respect, it is noted that the recent protocol between the Government and operators of the next generation networks provides for a credit line of 800 million euros.

“1 - To determine the promotion of investment in next generation networks as a strategic priority for the Country.

2 - To establish the guidelines for the promotion of investment on next generation networks, which are listed in the annex to this resolution and of which they are part.

3 - To decide that the following actions shall be taken.²⁹⁸

(...)

6 - Also, that measures must be taken aiming at the following outcomes:

a) To foster investment on remote or low population density areas under the terms to be proposed to the Parliament within the scope of the approval of the National Budget for 2009,²⁹⁹

(...)

c) to adopt the legislative acts or others needed to ensure access by all operators, under equal terms, to the network of ducts and remaining relevant facilities from all entities holding this type of underground infrastructure;

d) To eliminate barriers to the roll-out of optical solutions in connection with next generation networks in buildings, including the introduction of the appropriate changes to the technical regulations currently in force (namely ITED and ITUR)”,

while ICP-ANACOM is charged with "b) Defining (...) the regulatory framework applying to next generation networks, according to the guidelines defined for the sector's policy in the current resolution, including the analysis of the impact of geographic segmentation on the relevant markets at stake;”.

Subsequently it was determined to ICP-ANACOM that, *"with the purpose of providing the Government with the tools needed to adopt the measures mentioned in paragraphs c) and d)”, that:*

“a) It will list (...) the barriers currently conditioning access to ducts and other infrastructure held by the entities mentioned on no. 5 of article 26 of Law no. 5/2004, of 10 of February, by the entities covered by Decree-Law no. 68/2005, of 15 of March, and by the electronic communications operators, including the incumbent operator;

b) It will list the current barriers to the rolling-out of ducts, proposing measures aimed at their removal;

²⁹⁸ *“a) To promote the mass adoption of high speed Internet accesses and the development of advanced applications, in order to have 1 million users connected to next generation networks by 2010; b) To connect all primary and secondary education schools to next generation networks by 2010; c) To connect the whole network of hospitals and health centres to next generation networks by 2009; d) To connect all public justice services to next generation networks by 2010; e) To connect the public higher education and polytechnic institutions to next generation networks by 2009; and f) To connect the public museum and library networks to next generation networks by 2009.”*

²⁹⁹ *“In respect of National Strategic Reference Framework, any public investment in infrastructure for high-speed broadband in areas where market forces do not provide for the operating conditions necessary for the provision these services, especially due to demographic density, may be the object of the provision of support”.*

- c) *It will propose to the Government (...) actual measures, legislative or otherwise, to be adopted in order to ensure that all operators have open and effective access to the duct network and remaining relevant facilities of all entities with this type of underground infrastructure, for the installation of next generation networks;*
- d) *It will evaluate solutions aimed at eliminating or attenuating vertical barriers to the roll out of fibre optics, as well as solutions for sharing/lending infrastructure on buildings, which prevent the first operator to monopolize the access to them”.*

ICP-ANACOM, in compliance with this resolution, sent a proposal of legislative measures to the Government to be taken in the short and medium term, based on a clear and transparent regulatory framework that enables operators to make informed investment decisions, without deterring efficient and timely investment in the extensive and harmonious development of NGA.

It is argued by the most of the alternative operators, that the initiatives for investment in network, whether regulatory or from the State, should focus on the creation of a single national wholesale network, contributing to greater coverage of NGA. SONAECOM adds that only after the application of (some of) the measures presented, and as a final option, should forms of public financial support be considered, which support should always be based on the open network concept, also according to transparent and non-discriminatory models, needed for the development of competition, while the potential impacts which public financing systems may have on the competitive dynamic must be minimised.

ICP-ANACOM recognises that one of the advantages of a single NGA would be its potentially greater geographical coverage, especially in the early stages of development. Indeed, with lower overall infrastructure costs (i.e., in the most densely populated in the first phase) (more) funds could be freed up for investment, from the outset, in more remote areas, which would enable widespread access to new services within a shorter period. However, the single network solution also involves some disadvantages; the immediate transfer of the competitive dynamic from the infrastructure level to the level of services, with potentially less differentiation in this scenario (by being supported on a single network/wholesale offer, including "bitstream"). Furthermore, it may occur that the chosen architecture and technology may not be the most efficient and/or have the lowest cost, in light of the lack of competition at the level of own networks, whereby the objective of promoting efficient investment in infrastructure would not be ensured.

This is, in any case, a complex matter, as briefly discussed in the previous section, but one that certainly merits a thorough analysis by all stakeholders, including operators, the regulator and other public entities.

Additionally, PT states that such networks (promoted with the use of public funds) should only be developed in areas where private operators have not invested or are not expected to invest, otherwise there is a risk of creating barriers to the entry of efficient operators,

considering that competition based on own infrastructure is more successful and sustainable.

ICP-ANACOM also takes the view that *"the objective of regulation is to protect competition to the benefit of consumers and not to protect competitors"* as PT states, but obviously a market without competitors can never be competitive. Along these lines, it is also necessary to ensure that operators which have already invested efficiently in infrastructure, particularly in LLU, are able to remain in the market and further, obtain a reasonable return on their investment with the expectation of investment in NGA (again with the prospect of return on new investment). In this respect, note is made of the provisions of the Resolution: *"In areas where next generation networks using fibre are rolled out, (...) the challenge will be to encourage the development of alternative networks, without hindering the level of competition already reached in those areas, considering the high level of investment which they imply"*.

Furthermore, PT itself highlights that *"in Portugal, the main operator of LLU (...), has already demonstrated that it has capacity to embark on a process of significant investment in NGA"*. It noted however that in the short and medium term, alternative operators will need revenue from LLU supported services while they try to tempt customers to migrate to new NGA based offers.

ICP-ANACOM notes the position of PT on the need to maintain *"a permanent level playing field which is non-discriminatory for the development of NGA, which allows all operators to invest in this type of access network"*. As previously mentioned, the RCAO represents a good starting point for this apparently common objective, *"notwithstanding any improvements which may be enacted"*, as also recognised by PT.

According to ICP-ANACOM, the existence of a *"level playing field"* at the level of passive infrastructure will be a strong incentive for investment and innovation in NGA, including for PT, especially if there is widespread access (e.g., infrastructure owned by operators, public authorities and utilities) and/or sharing, possibly according to conditions of symmetry.

In this context, as stated by FCCN, an *"intervention of State funds should be limited to passive infrastructure and less dependent on technological developments such as conduits, cables, interconnecting rooms or poles and to reduce the costs and complexity of operation, to facilitate their use by various operators (responsible for the active components of the networks) and promote competition and innovation"*.

Along the same lines, more specifically, VODAFONE and ZON again propose the adoption of single and open network model (*"with the inherent resolution of the problem of access to conduits"*), including the principle of the technological neutrality of regulation and allowing, at the same time, the sustainability of operators which make investments in their own networks and in LLU, since it enables the progressive migration of services.

Meanwhile, most of the entities argue that access to basic support infrastructure belonging to a wide range of entities (concessionaires of the State, utilities, etc.) may be an important driver of the mass roll-out of broadband, especially in areas of low population density. However, several entities cite constraints at this level, especially with respect to the uncertainty about the technical suitability of using such infrastructure, in part due to the lack of record information. It is further mentioned that this access is dependent on the willingness of the entity owning the infrastructure and is subject to negotiations on a case-by-case basis.

Another constraint mentioned is the alleged lack of legal/administrative framework for access to such infrastructure. Specifically, according to PT³⁰⁰, it is necessary to articulate the regimes governed both by the 2nd part of article 26 of the LEC and Decree-Law no 68/2005 of 15 March, and to review the latter in particular, in order to clarify the legal framework, including its scope of application, timeframes or the alignment of conditions of access ("*defined so as to ensure a fair payment for use*") of property, which often, is public and part of a concession.

ICP-ANACOM has already pointed out that it is important that operators seeking to invest in NGA may have the broadest possible access to passive infrastructure, particularly in areas not covered by PT's network³⁰¹ or where the network is fully occupied and/or in more remote areas, with special attention given to the fact that the costs of the construction of this infrastructures will - as appears seems consensual - constitute a major investment in fibre optics. In order to reduce the "horizontal barriers" the adoption of measures enabling open, widespread and non-discriminatory access to conduits poles and other facilities can and should be encouraged, whether such facilities belong to operators, or to entities which, operating in other sectors, possess extensive passive infrastructure such as networks of conduits and poles.

At the legal/administrative level, there is an expectation in the short term, that conditions giving basis to this widespread access may be put in place, with the establishment of an appropriate legal framework consistent with the LEC. In this context, the Government decided, by means of the Resolution, that measures must be taken to "*adopt the legislative acts or others needed to ensure access by all operators, under equal terms, to the network of ducts and remaining relevant facilities from all entities holding this type of underground infrastructure,*". To this purpose, ICP-ANACOM shall "*propose to the Government (...) actual measures, legislative or otherwise, to be adopted in order to ensure that all operators have open and effective access to the duct network and remaining relevant facilities of all entities with this type of underground infrastructure, for the installation of next generation networks*", which act has already been concluded.

³⁰⁰ Which for a number of years has been making use of infrastructure contracted from entities other than telecommunications operators, according to partnership protocols

³⁰¹ Network and infrastructure that ICP-ANACOM recognizes, at the outset, is better prepared for the extension of fibre optics.

The specific conditions that this type of access must obey, always in compliance with the principles of transparency and non-discrimination, should be defined, taking into account the interests of all stakeholders, operators and entities in possession of infrastructure, with the objective of enabling access to the infrastructure in an efficient and effective way, with the lowest possible cost.

ICP-ANACOM is aware of the complexity of the matter and recognises that, in view of possible constraints at a technical level and/or in terms of capillarity, such infrastructure may not, in certain cases, substitute the infrastructure of PTC (and the RCAO), but rather complement it in certain areas.

With respect to municipal fees, most of the entities considered this system to be lacking, unharmonised, complex and difficult to apply. Several proposals are made to change the system, whether legal or procedural, with particular concern for the need for harmonization and reduction of the value of the fees charged by municipalities.

ICP-ANACOM agrees that the existence, also in this respect, of a system that defines rules and procedures which are simplified, harmonized, non-discriminatory, efficient and effective would be desirable, to promote and not restrict, the development of infrastructure and networks by those who seek to invest. Accordingly, the issues related to MFRW were taken into account in the referenced response to the Government and subsequent measures.

According to several entities, the Autonomous Regions of Azores and Madeira will not, from the outset, be targets for NGA investment, due to their outlying locations, low level of vertical construction, and low density of population scattered over several islands. The construction of NGA implies greater investment and a longer time needed for return on such investment, whereas ALCATEL-LUCENT calls for the intervention of Central and Regional Government (e.g. through public-private partnerships) to avoid a "digital divide". This can be combated according to VODAFONE, with a single network, which will create the conditions for competition to exist.

As stated above, in the Resolution the Government sets out that incentives may be granted, in the short term, for investment in remote areas or areas with low population density³⁰². However, the Autonomous Regions are, by their very nature, the most remote regions of Portugal, while in the Azores there is also wide dispersion of population over the various islands³⁰³. In this sense, and since it not reasonable that, as referenced by VODAFONE, "*citizens of these outlying regions, in line with others in the interior of the mainland, are excluded from the Information and Knowledge Society*", these constraints must be taken into account in the planning of any investment incentives.

³⁰² As also provided for in said Protocol of January 2009.

³⁰³ Madeira has a higher population density, around the city of Funchal, but (the rest of the island) has mountainous relief.

ICP-ANACOM considers that with respect to evolution to NGA, an effort should be made by the relevant public authorities to ensure that all citizens, regardless of their location, in urban or rural areas or very remote areas, are able to access the same services, i.e., there is effective national coverage. A broadband connection of schools, hospitals and other³⁰⁴ - possibly, all - government agencies located in these more remote areas may be an incentive and/or a first step towards achieving this objective by reducing the impact of lower return on investment in these areas,

Another constraint receiving a lot of attention is the cable connection between the mainland and the autonomous regions, including the fact that the fibre optic rings that support these connections remain the property of PT³⁰⁵, with the consequence, according to RGA, that "*only this operator can make investment decisions with respect to NGA.*". PT takes an opposing view, arguing there is potential in the Autonomous Regions for competition in the provision of access to broadband services and for the roll-out of NGA, since these are two of the areas of the country with the most extensive (with a high level of capillarity) cable network (in addition to the copper network).

ICP-ANACOM recognizes there is a potential constraint on the entry and/or growth in the regional market for alternative operators. Firstly, because the problems of insufficient capacity, which for a period of about a year limited requests to increase the capacity of the alternative operators, may be reproduced or exacerbated in the context of NGA³⁰⁶. Secondly, because these links are over very long distances, their cost (for PT) and, of course, the price charged (to the operators) for the rental of capacity are very high, especially when compared to the costs and prices of connections in urban areas, such as Lisbon and Porto.

This Authority shall take measures within its powers to ensure that the links between the mainland and the autonomous regions do not constitute a factor impeding the development, in a competitive environment, of NGA in these regions and of social cohesion.

2.2.11 The RCAO and the importance of access to pipelines

Question 36: What types of solutions for the development of optical fibre are most appropriate? Do you consider that the current RCAO allows operators to extend their own optic fibre in a massive way to FTTCab solutions, and possibly to FTTH/B solutions? What changes or

³⁰⁴ As provided in the Government guidelines and in the recent Protocol of January 2009.

³⁰⁵ The operators allege that there are constraints associated with capacity available in these connections and a lack of transparency in its management, operation and maintenance.

³⁰⁶ It is noted, however, that there are currently no problems evident in terms of the available capacity in optical submarine cables, the upgrade of which was completed in the 3rd quarter of 2008, whereby PT and alternative operators may see their needs for additional transmission capacity satisfied.

improvements do you consider are needed in terms of the RCAO, in order to achieve this goal?

The topics covered in this issue are, according to PT, very similar to those raised by question 25, and it refers to this response.

PT states that it cannot identify a more appropriate solution from the various types of solutions for the development of optical fibre, because this will depend in large part on the goals and strategy of the operator concerned³⁰⁷. Nevertheless, the existence of the RCAO has made a huge contribution, according to PT, to the removal of one of the most important barriers to the installation of fibre optics, whereby it is considered a suitable and sufficient instrument to support competition in the field of NGA and to provide for investment and competition according to conditions of equality.

PT identified the opening up of physical infrastructure belonging to other entities, whether underground or not, as possible improvements in this field.³⁰⁸, for the installation of telecommunications infrastructure.

CEGEA refers to its response given to question 25.

FCCN considers that the development of an accurate digital record of existing conduits, covered by RCAO would represent an essential improvement to facilitate the process of mass installation.

According to COLT, operators are faced with situations in terms of the RCAO which prohibit its proper use (e.g. obstructions), situations which should be resolved without delay based on a joint understanding and, if possible, with the assistance of local administrative bodies, enabling the quick and efficient installation of optical fibre.

ONI states that the operational difficulties of the RCAO have been previously identified and that solutions have been proposed to ICP-ANACOM, either by individual operators, or through APRITEL. It adds that the RCAO may be complemented by a fibre optic backhaul offer.

ZON states that the solutions for the development of fibre optics will depend on several factors such as geographic location. However, irrespective of the solution, ZON considers that access to conduits, free of procedural impediments and other barriers, is essential to the development of the network. For changes and practical improvements, it cites, in the very short term, the provision of shorter deadlines for intervention and the inclusion of information on the available space in conduit, and over the longer term, structural separation.

The position taken by SONAECOM on the most appropriate measures for the development of optical fibre, from a strictly regulatory perspective, was expressed in its responses to

³⁰⁷ It may also vary according to ZON, depending on the areas where the fibre is installed, the population density, whether or not it is installed in a new urban development and many other factors.

³⁰⁸ Water and energy companies, municipalities, road and rail infrastructure, etc..

questions 19, 20 and 23 to 26. On this issue, it only draws attention to the fact that the RCAO should not be seen as the only instrument available to the regulator to achieve this goal, with measures which will need to be imposed with respect to Market 4 assuming special importance, both in terms of the sustainability of the current business model based on the RUO, and during the phase of migration and operation of NGA.

According to SONAECOM, functional separation should be viewed as being irrelevant to this topic, especially when the regulator itself states: "*It is important to note that the existence of the RCAO, in any case, is presented as an instrument of not negligible consequence for the construction of a "level playing field" which is non-discriminatory for the development of NGA*". Effectively, the RCAO (and other regulated offers) enacts, in the opinion of SONAECOM, a clearly discriminatory situation, insofar as PTC does not follow the procedures set out therein for the installation of fibre optics. In SONAECOM's opinion, this fact constitutes a very important competitive advantage and prevents the existence of a "*level playing field*" in relation to the RCAO and the remaining reference offers. Believing in the conviction of the regulator on the importance of harmonization of conditions, SONAECOM argues that functional separation (at least in respect of essential assets such as conduits and associated infrastructure) is the only measure that can ensure the required equivalence of access³⁰⁹.

VODAFONE considers that the sharing of soil and subsoil infrastructure (such as conduits, poles, access to buildings and to street cabinets) is the most efficient and rational solution both in economic terms and in terms of the use of resources³¹⁰, for the development of NGA. In the opinion of VODAFONE, and given that the model which it calls for in respect of NGA is based on the existence of a single network, not only the infrastructure of PT, the costs thereof should be shared. Accordingly, it supports the definition of a transparent and non-discriminatory framework which ensures full access to operators interested in FTTCab and/or FTTH/B solutions to all the infrastructure owned by public, semi-public and/or private entities.

VODAFONE believes there are three key aspects in the definition of a future framework for access to all infrastructure capable of encouraging the expansion of NGA, whether this is through a single network as it proposes or whether the option is taken to establish different NGAs which overlap geographically:

³⁰⁹ SONAECOM adds that functional separation would also have the advantage of relieving PTC from a set of obligations and tasks whose completion is, in the case of a vertically integrated operator, contrary to their commercial interests, but which, if assigned to an independent (in terms of a model of functional separation) entity, would coincide with that entity's natural incentives.

³¹⁰ To prevent their duplication, VODAFONE comments that it will minimize inefficiencies and avoid all the inconveniences and disturbances arising from any works and other interventions in the public domain.

- Provision of information and conditions of viability and use of conduits³¹¹.
- Prices³¹².
- Levels of quality of service³¹³.

Question 37: In view of there being an offer of access to conduits, do you consider that it necessary and justified for the incumbent to establish a dark fibre offer? If so, in what situations?

According to PT, there are no grounds for the imposition of a dark fibre offer, notwithstanding the fact that operators are able to make use of the dark fibre offer which PTC makes available as part of its commercial activity³¹⁴.

FCCN states that a dark fibre offer could be applied in situations where there are technical barriers impeding the provision of space for new cables and should be guaranteed for all operators.

CEGEA considers that there are grounds for a dark fibre offer in situations where it is not possible to use the existing conduits, which offer could provide an incentive to climbing the investment ladder, since the alternative operator will have to install equipment at network termination points. CEGEA also notes that a bitstream type offer will also be an alternative which should be considered where it is not possible to use dark fibre.

According to COLT, dark fibre will be essential to allow access to sites where there is no potential for immediate installation of fibre optic cables. It is therefore considers that there is a need for a regulated dark fibre offer.

ONI considered that it is essential to create a dark fibre offer with national scope, given the operational difficulties of the RCAO, particularly because there is no guarantee of conduits which can be used for access at specific points (e.g. street cabinets).

In case of conduit capacity, according to ZON, it is vital for the first operator placing fibre to ensure that there is space available for the operators which follow and, possible cede dark fibre to the other operators.

³¹¹ According to VODAFONE, it is key that information is properly registered and clearly reflects the actual situation on the ground (including the state of occupation and/or repair of the infrastructure) and, in parallel, the availability of such information in a simple, secure and transparent which is accessible at any time by any operator which express its interest in this respect.

³¹² Which in the opinion of VODAFONE must be reasonable and reflect the costs which the owner entities demonstrably incurred in the provision of access.

³¹³ According to VODAFONE, the levels of quality of service of any offer should be based on the provision of services in perfect conditions of use and, in parallel, mechanisms of compensation should be established which discourage non-compliance with strong and effective penalization of the entity which owns and provides the service, where it fails to comply with any of the rules defined in the offer and the contract, which it submits does not occur with respect to the RCAO (e.g., by relieving PTC of the requirement to pay penalties when the forecasts of the beneficiaries have a divergence from the reality exceeding 20%).

³¹⁴ As stated in its response to question 29, PT argues that the provision of access to conduits and poles duly addresses the needs of operators with their own access infrastructure.

SONAECOM considers that the mere existence of the RAO does not invalidate the need for a dark fibre offer. As SONAECOM stated in previous responses, this offer makes sense in a number of different situations, when:

- there is no conduits space and there is fibre available;
- a RUO beneficiary seeks to install equipment in an AP, RU or street cabinet, the establishment of which was not properly disclosed (including associated information) and, as a result the beneficiary sees its business plan affected without having been given an opportunity to incorporate this change in market conditions in a timely manner.³¹⁵; and
- any operator has SMP in the relevant market (Market 4).

Regarding the first situation, SONAECOM does not immediately dismiss the principle of symmetry, but notes that this rule may cause considerable harm. Effectively, if it is assumed that the operator which is required to provide the dark fibre should always be the last operator to occupy the conduit, SONAECOM considers that the high probability that the last operator may have only occupied half the space that it really needed in the short term can be ignored, whereby an obligation will be imposed to transfer the optical fibre precisely to the operator with less excess capacity. That is, SONAECOM takes the position that in the application of the rule, account must always be taken of the operator with more excess capacity and, necessarily, the rate of customer requests and consequently the use of available capacity. Account must also be taken, according to SONAECOM, of the fact that an operator which places fibre optic for the first time in an areas and is still in the initial phase of gaining customers should be entitled to a specified grace period.

In short, SONAECOM submits that the definition of the specific rule for the provision of dark fibre requires information on the actual occupation of the conduits as well as the effective use (date of installation and commencement of use) of the optic fibre installed. Without this information available on the Extranet, any proposed mechanism will not, in SONAECOM's opinion, achieve its objectives and, therefore, until there is provision of full and complete information by PTC, the responsibility for ceding dark fibre shall fall to PTC. As regards the imposition of a particular type for this offer, SONAECOM considers that this should be the subject of a specific consultation, given that its implications will depend on the options of each beneficiary in particular, submitting that, at this point, discussion of this issue is premature.

As mentioned previously, VODAFONE considers that the current provision of access to conduits, as currently exists, does not facilitate the development of NGA. VODAFONE takes

³¹⁵ In such cases, as mentioned in previous responses, SONAECOM argues that this offer should be free insofar as it is the only way, on the one hand, of discouraging changes being made to the access network in the future without respect of the principle of transparency of information, and on the other, that RUO beneficiaries can ensure that their business plans are not altered (which implies that the costs associated with additional fibre to the new street cabinet are not incurred by the beneficiary).

the position that a reference offer for dark fibre, especially between the core network nodes of operator and new APs, could help overcome some of the difficulties that alternative operators have faced in extending their networks, in particular their access network. It considers it necessary, however, to avoid the repetition of the shortcomings identified by the various beneficiaries in the various reference offers of PTC³¹⁶.

Question 38: In the event that another operator is the first to occupy the remaining capacity of conduits in a given geographical area, with installation of a fibre network, does it make sense to compel it to grant access to fibre in this geographical area? If so, under what conditions?

From the outset, according to PT, NGA solutions should not be made subject to regulatory intervention³¹⁷, whereby regulatory provisions should reward those who invest.

However, PT considers that situations should be evaluated in their specific context, taking into account the conditions at the level of existing infrastructure and the geographic markets concerned. In the event that the holder of the optic fibre (PT or another operator) opts for PON architecture, as it appears will happen given its technical and economic benefits, PT states that severe technical difficulties will be faced in the sharing fibre associated with the complexity of installation (distinct from those of copper) with implications for network planning and engineering, at the level of the investment involved and the final price to the consumer.

It considers therefore that the principle of symmetry must be applied also in this respect, at the level of regulatory obligations and access to fibre optics should not be imposed on any operator. Assuming that PTC's conduits are being targeted, the operator takes the position that this situation could be overcome in the event that access to the conduits of other entities is imposed

FCCN argues that the regulatory framework associated with NGA should favour greater symmetry of regulation. In this respect, it agrees that an operator which occupies the remaining conduit capacity in a geographical area, with installation of a fibre optic network, is obliged to provide access to fibre in that geographical area.

CEGEA believes that the response to the question depends on market conditions. In this sense, it indicates that if the operator occupying the remaining capacity of the conduit with the installation of a fibre optic network has SMP, consideration may be given to the possibility of obliging this operator to provide access to fibre optics. If the other operator has SMP then this should assume priority in this transfer.

³¹⁶ Including the possibility of inaccurate prices, penalties which do not encourage compliance with quality of service levels and procedures that do not safeguard the interests of alternative operators.

³¹⁷ As mentioned, in particular, in response to questions 9, 18, 19 and 28, PT consider that the regulatory framework should be an incentive to investment and not intrusive.

COLT considers that the obligation, where existing, may be applied generally to all operators. It takes the position, however, that in first place, access to the incumbent's network should always be permitted, and only in the absence of such access or where it is impossible, should situations of access to the network of other operators be explored.

If the network operator model is adopted for the development of NGA, ONI believes that this problem will be largely overcome. However, with this model, if other operators move towards individual installations, they should be subject to symmetric regulation (except in cases of links to individual customers). With the model of infrastructure competition, ONI argues that asymmetric regulation with respect to the dominant operator should persist.

According to ZON, the possibility mentioned by ICP-ANACOM in this question would make sense to ensure competitive supply³¹⁸.

SONAECON responded to this question in conjunction with its response to question 37.

According to the position taken by VODAFONE, both in a scenario where investment is expected in NGA supported through the RCAO, and in a single network scenario³¹⁹ built across the infrastructure and conduits of various entities, the available space in conduits is a critical bottleneck that may represent a barrier to entry or network expansion. For this reason, it advocates the establishment of a clear and effective framework, leading to the freeing up of inefficiently occupied space in conduits as well as to the expansion of conduits whenever a certain percentage level of occupation is identified.

As already indicated by VODAFONE, access to fibre optic by third parties, in particular, the possibility of unbundling, has its limitations³²⁰ related to network topology adopted by the owner of the network. However, it argues that in a scenario where there may be constraints in terms of availability of access to conduits it would make sense to analyze the imposition of an offer of access to the fibre in this location. VODAFONE adds that the question should be approached not on an individual basis but rather with an approach integrated with the market analyses defined in the Community regulatory framework and *ex-ante* regulatory measures imposed on the entity with SMP, creating a predictable regulatory environment that fosters market growth and does not provoke disputes which paralyse the market.

³¹⁸ As mentioned in its response to the prior question, ZON considers it essential that an operator which is the first to place fibre should allow space for the following operators, which may at some point cede dark fibre.

³¹⁹ VODAFONE believes that it is the more efficient scenario since it reduces the conflict of occupation and allows better planning of expansion.

³²⁰ And problems with the implementation of a measure that may be considered, to some extent, case by case.

Question 39: In a scenario where due to lack of conduit capacity in a given geographical area, where a requirement for access to fibre is imposed (in some of the technically feasible alternatives), do you consider that it would make sense to impose point-to-point topology due to the ease and diversity of access models?

PT considers such a solution unacceptable, arguing that the regulation should not interfere in the technical options of operators, which would impact NGN/NGA investment plans (already very high) and discourage the existence of alternative infrastructures. According to PT, such intervention would be disproportionate and excessive. With respect to the specific imposition of a point-to-point topology, PT considers that it would only turn any shortage of conduits in a given area into a bigger problem, affirming that the point-to-multipoint solutions are those which minimize the number of optic fibres to be installed.

FCCN considers that, in a situation where access to fibre optic is imposed due to lack of conduit capacity, point-to-point topology should be adopted, due to greater ease and models of access.

CEGEA states that the choice of topology to be adopted should be left to the market.

COLT considers that it is proper to impose point-to-point topology.

In the decisions which will be taken with respect to the *ex-ante* regulation of NGA, ONI believes that ICP-ANACOM should take special care in imposing the choice of solutions on dominant operators, so that they do not limit or prevent the unbundling of fibre optic loops. This imposition should, according to that operator, be independent of whether or not there is existing capacity in conduits, which limitation could be addressed by a dark fibre offer. Where unbundling is completely impossible, ONI proposes the imposition of an appropriate bitstream offer, which does not limit the definition of the beneficiary operator's retail service.

The availability of dark fibre may, according to ZON, serve the interests of operators, while considering that all solutions must be studied in greater depth.

SONAECOM responded to this question in conjunction with its response to question 37.

In a scenario where underground infrastructure has scarce physical resources in a given geographical area, VODAFONE takes the position that it does not make sense to use point-to-point topology, since this type of topology takes up much more occupation of the conduits compared to point-to-multipoint topologies³²¹.

Position of ICP-ANACOM

The specific issues concerning the RCAO, which various entities referenced in previous responses, have been dealt with in detail, especially in the position of ICP-ANACOM with

³²¹ According to VODAFONE, the number of optical fibres needed in point-to-point topology will be tens of times higher than the number used in point-to-multipoint topologies.

respect to section 2.2.8 (question 25). Likewise, functional separation and related issues are issues which have already been discussed in Section 2.2.7.

It is stated that the offer of dark fibre may be applied in situations where there are technical barriers which impede the immediate availability of space for the installation of new cables, and may be an incentive to climbing the investment ladder. In this regard, VODAFONE argues that a dark fibre reference offer, especially between the core network nodes of the operator and new APs, could help overcome some of the difficulties that alternative operators have faced in extending their networks. Other operators also advocate the establishment of this (reference) offer³²², even though SONAECOM noted the need to define a rule of appropriate applicability and availability of information on the use of conduits as well as installed fibre optics.

The possibility of applying, in this respect, a rule of symmetry (in the offer of optical fibre) is supported by several of the entities that responded, whereas PT considered that the principle of symmetry at the level of regulatory obligations would result in no imposition of fibre optic access on any operator. This entity further considers that any lack of capacity in (their) conduits may be overcome, if access to the conduits of other entities was imposed. According to VODAFONE, the space available in conduits is a critical factor in the entry or expansion of the network, whereby the operator advocates the establishment of clear rules for the release of inefficiently occupied space in conduits and for the expansion of the conduits where it has been identified that a certain percentage level of occupancy has been reached.

ICP-ANACOM considered in the public consultation document, that a dark fibre offer by the incumbent operator or other entities with excess capacity could, from the outset and in certain situations, be complementary to existing conduit access offer, with the advantage that it could contribute to a reduction in the overall level of investment, freeing up resources for greater coverage of the country.

It was also stated that any obligation of this type could only, in principle, be imposed on a provider with SMP in the relevant access market(s) and provided that fibre optic solutions of the FTTCab and/or FTTH/B type are used.

It is noted, on the other hand, that in the previous section ICP-ANACOM considered that the existence of the conditions which are effectively non-discriminatory and transparent and with cost orientation at the level of access to PT's and, if necessary, third party infrastructure (including conduits), could and should create equal opportunities of investment and development in fibre optic networks. In a scenario where access to infrastructure is guaranteed according to these terms, there are no grounds for the imposition of an obligation of fibre optic unbundling in areas where there may be competition in infrastructure,

³²² What is not justifiable in PT's view, since it considers that operators can use the commercial offer of dark fibre that the company has in place.

i.e., where there are no effective (technical or economic) restrictions on the installation of alternative fibre optic networks.

In this scenario, ICP-ANACOM takes the position that there are no grounds for the imposition of a general obligation of access to dark fibre, regardless of circumstances, including in the form of a reference offer at core network level, i.e., the transport network between the switching nodes. It is noted that there is a considerable group of operators which have a high capacity transport network (supported over fibre) to connect network nodes, including connections to co-installed equipment (with respect to the RUO, RIO or LLRO).

However, where there are situations in which there is a lack of spare capacity in existing passive infrastructure (e.g. conduits or poles), in particular with respect to the RCAO and at the level of the access network, and with fibre optic on such section(s), it is reasonable to require PT to allow access by interested operators to this (surplus) optical fibre, which measure promotes efficiency and may even allow for greater utilization of PT's infrastructure.

However, any increased potential for dispute with regard to whether (or not) there is actual capacity with respect to the passive infrastructure and optical fibre should be taken into account. The fact of having to perform a case-by-case examination at the level of the various "sub-sections" (i.e., different conduits and other sites of fibre optic passage, especially between the core/exchange and the buildings to be connected) to assess capacity, both in terms of space and the capacity of optical fibre cables, may make this a complex process³²³.

Additionally, in a scenario of development of FTTH/B solutions with PON topology, especially by the incumbent operator, ICP-ANACOM acknowledges the complexity associated with the installation and sharing of fibre optic, whereby any unbundling - i.e., at the last splitter - would occur at the level of the building itself in areas of high population density³²⁴. In this scenario, any obligatory offer of backhaul up to this splitter in (or near) the building, by the entity with SMP, would in fact constitute a dark fibre offer with "universal" coverage at the level of the access network, whereas it is important to state that the costs to be incurred by the operators through the rental of this fibre optics would probably exceed the direct cost that they would incur in the event that they installed the necessary cables themselves (i.e., in a manner similar to that currently followed by the beneficiaries of the RUO for the connection of co-installed equipment to their core network).

The European Commission stated in the draft Recommendation that where operators with SMP have installed fibre to home, regulators should impose additional obligations of access

³²³ It is noted that ICP-ANACOM has had to intervene with respect to the procedures, for the detection and resolution of constraints (on co-installation) in the exchanges/MDFs of PT, which procedures have proved relatively complex where there are differences between RUO beneficiary operators and PTC.

³²⁴ In areas of more recent construction, the buildings/condominiums are larger, which implies the installation of a *splitter* of 1:32 or up to 1:64 (if technically feasible).

(access to dark fibre) in addition to access to passive infrastructure (including conduits) when this last option is technically or physically impossible or when it is not economically viable for there to be a sufficient number of operators in competition³²⁵.

In more remote, less populated areas it is unlikely, as is acknowledged in the responses to the consultation, that competition will emerge between different fibre optic networks and, from the outset, a possible dark fibre reference offer for may not be "the solution" given the expected complexity at the level of network planning and installation and, crucially, the costs incurred through its rental, especially in these areas, where the revenue from the services to be offered are potentially much lower than in urban areas. In this context, the European Commission recognises that there may be cases in which competition between (network) infrastructure may not be feasible, because conduits are not available or because the population density is too low to sustain the business model. In these cases, the European Commission considers that access to other passive elements (dark fibre) or active elements should be imposed, to ensure competition between services (bitstream)³²⁶.

In a scenario of development of FTTCab solutions with unbundling at the level of the sub-loop (in copper), the extension and capillarity of the fibre optic network to be installed is much lower, and to some extent already covered by existing core/transport networks. In this scenario, it is therefore much less likely that there are restrictions on capacity in passive infrastructure (particularly in the context of the RCAO), while the backhaul connection between the co-installed equipment and the network of beneficiary operators may be carried out in most cases, using the extension of optical fibre itself.

However, in the event that there are capacity restrictions in the conduit, it should be possible to use the surplus fibre optic of PT or, as an alternative, the offer of transmission capacity. That is, in the event that PT implements FTTCab type solutions and operators decide to (co)install (in or) at the street cabinets, a specific backhaul offer should be made available by PT³²⁷, possibly an extension of the "signal transport service" (in practice, a dark fibre connection for backhaul at short distance) provided by PTC according to the RUO.

It is noted in this respect that the beneficiary operators of the RUO have been asking for a "substitution" of PTC's signal transport service mark with the possibility that they themselves extend fibre optic between their network nodes and equipment co-installed at PT's MDFs.

³²⁵ See Draft Recommendation (paragraph 15, page 8): "[w]here SMP operators deploy fibre to the home, NRAs should impose further physical access obligations (access to unlit fibre) beyond access to ducts, other civil engineering works and other elements which are not active, where access to this infrastructure is technically or physically impossible or where it is not economically viable for a sufficient number of operators to ensure effective competition."

³²⁶ Explanatory Memorandum, page 4: "[t]here may however be cases where infrastructure competition is not viable because the ducts are not available or because the population density is too low for a sustainable business model. In such cases, access to other passive elements (dark fibre) or access to active elements - service-based competition ("bitstream") - should be mandated". The possibility of a bitstream type offer for these more remote zones is examined in section 2.2.14.

³²⁷ The draft Recommendation states that "[w]here a SMP operator deploys FTT[Cab] NRAs should ensure that access to sub-loops is supplemented by appropriate backhaul measures".

2.2.12 ITED regime

Question 40: Do you consider the legal and regulatory rules on access (e.g. in fibre optic) to the buildings and homes of customers by operators to be sufficient, including in terms of incentives for the sharing of support infrastructure? If not, what alternative solutions could be proposed, taking into account the constraints imposed by the legal horizontal property regime?

PT considers a review of the legal and regulatory rules concerning the ITED regime to be of the utmost urgency. It takes the position that the regime is inadequate and insufficient in terms of meeting the current needs of operators and in terms of it being possible to develop NGA quickly and efficiently, ensuring compliance with the objectives of rolling out this type of infrastructure within the period announced by the Government in its Resolution. Being a subject which requires thorough examination, PT suggests that a Working Group be established with the aim of carrying out a comprehensive study of all the measures adopted in this area and presenting a set of proposals for legislative change.

According to ALCATEL-LUCENT, one of the biggest problems with an FTTH solution is related to cabling inside buildings. It therefore proposes that access to conduits and the re-use of manholes (including water, electricity or sewers) are coordinated. In old buildings (historical), it considers that external cabling is not an option. When there are a lot of owners, ALCATEL-LUCENT considers that it is complex to obtain permission for new cabling and the development of FTTH may be delayed by the existence of multi-dwelling buildings in cities. The FTTB option (micro-DSLAM in the basement, maintaining copper wiring) also has drawbacks and long term (capacity) limitations, whereby the company indicates that there should be a systematic strategy for the medium term, based on the following possible conditions for the success of fibre optic cabling in buildings:

Issue	Solution
Convincing owners of the value of the FTTH	National campaign promoting FTTH (operators, government); Involvement of local communities.
Earning the confidence of the owners with respect to the legal conditions of cabling	Contract of rules set by the regulator (i.e., guarantees of multi-operator access, maintenance of infrastructure); simplification of authorisation procedures.
Productive and quality cabling	"Fibre-ready" stickers on the building; formal rules of construction; standard interconnections.
Synergy with building construction	Mandatory cabling in new buildings; synergies with civil construction work performed by other utilities.

COLT argues that the legal and regulatory rules on access to buildings (and customer homes) is insufficient, whereby it proposes the revision of the conditions, irrespective of year of construction of the building, as well as the procedures for authorization of condominiums, seeing that it calls proper access into question.

Similarly, according to ONI, the legal and regulatory rules are inappropriate, suggesting the adoption of measures that enable interventions in condominiums for the installation of communications infrastructure to be simpler and more flexible.

ZON states that the legal rules in force³²⁸ may have an important role with respect to the deployment of optical fibre in new buildings (to immediately facilitate the installation of optic fibre in new or restored buildings, including, in the light of certain conditions, prohibiting the management of the building from opposing the installation of telecommunications infrastructure for individual use³²⁹), but with limitations stipulated by the legal horizontal property regime, i.e., according to ZON, the current statutory scheme is shown, in some cases, to be insufficient for the promotion of access to buildings by operators. As such, according to ZON, any amendment of ITED will always have a limited range to the extent that the problems of access to the building persist at the level of civil law³³⁰.

To this purpose, and notwithstanding recognition of difficulties of legislative intervention in this matter, ZON suggests the modification of the existing legal rules governing horizontal property, and in particular, the procedural system for the adoption of resolutions by the assembly of Condominium Owners, in order to streamline the procedure for the granting of permission by the owners for the installation of optical fibre in the building. Some of these changes³³¹ could entail, according to ZON, the imposition of the scheduling of these topics on the agenda of extraordinary meeting of condominium owners (being sufficient for this purpose, the proposal of a single condominium owner), through the requirement of the condominium administrator to call the extraordinary meeting immediately following the receipt of a proposal of an operator for the installation of optical fibre in the building, or even the mandatory inclusion of this proposal on the agenda, even if not foreseen upon convocation.

As explained in its response to questions 17 and 18, SONAECOM advocates the amendment of ITED, referring to the responses given in this section.

VODAFONE also advocates a general review of the legal rules on horizontal property and the deployment of horizontal infrastructure, which review should have the objective that no building, regardless of the year of its construction, is unable to receive fibre optic infrastructure or to freely choose their supplier of fibre optic based communications services. According to VODAFONE, the legal rules should establish conditions whereby any work on the physical infrastructure of entities offering public services, as well as municipal bodies or other entities with underground or access infrastructure to buildings, or expansion of such infrastructure, is accompanied by the installation of the resources enabling fibre optic

³²⁸ Decree-Law No 59/2000 of 19 April, which sets the rules applicable to ITED.

³²⁹ According to art. 20, paragraph 2 of ITED.

³³⁰ ZON states that the difficulties which can arise in respect of access to the building, whereby permission is required from owners for the purpose of installing fibre optics, subject to payment of a certain amount, lead to a lengthy and complex process.

³³¹ Which are found, for example, in the implementation of the French NGA.

passage and other work for enabling the fibre cabling of public and private buildings used for housing, industry and services, or of mixed use. Special attention should be given, in the opinion of that operator, to (i) the removal of unused material, freeing up space and (ii) the management, in a standardized way, of records pertaining to such infrastructures and facilities.

In terms of ITED and with respect to buildings to be built, VODAFONE suggests consideration of several substantive changes to the technical method of construction of infrastructure, in particular:

- the installation of an ODF in ATE (formerly RGE) with capacity to terminate a pair of optical fibres for each independent unit of the building;
- installation of fibre optic cabling from the ODF to all independent units with the pair terminated in the wall socket;
- inclusion of additional space of 60x40x15 cm in the ATE;
- pre-installation of a 230VAC 16A power source for permanent use, linked to the Electric Panel of General Service of the condominium.

Question 41: What technical adaptations do you consider should be proposed in terms of ITED, also taking older buildings into account?

Notwithstanding the results of the Working Group which it proposes, PT maintains that the system of access to buildings by operators must be identical in all buildings, whether ITED, RITA or earlier, whereby the ITED Manual and Decree-Law no 59/2000 should be revised accordingly. In this review, PT submits that particular attention should be paid to the conditions of access to the private domain, defining clear and comprehensive criteria for access to the infrastructure of buildings and conditions for using and sharing them.

FCCN comments that the models for the financing of the installation and the recovery of costs in older buildings, as well as liaison with the condominiums, should be defined with great clarity. It further indicates that, the responsibilities, duties and rights of each party must be known by all. FCCN ends by advocates the choice of a model which encourages condominium owners to accept and support the installation of NGA.

According to COLT, the internal cabling of buildings should be subject to reformulation and new buildings should consider surplus cabling for future use.

According to ONI, the new rules should apply equally to new buildings. With respect to older buildings, ONI supports a case by case process which limits the impediments created by the Assemblies of Condominium Owners.

According to ZON, the technical adjustments will entail the existence of quality common spaces in older buildings, which ensure the same functionality, flexibility and robustness as guaranteed in the case of a new building.

As explained in its response to questions 17 and 18, SONAECOM advocates the amendment of ITED, referring to the responses given in this section.

VODAFONE argues that ITED should be updated so that the provisions on communications infrastructure in buildings specifically include the passage of fibre optic and the conditions for the provision of fibre optic based services, regardless of the provider selected by the owner of the building or part of the building. In particular, in buildings already constructed, VODAFONE considers that ITED should contain mechanisms which permit the rapid alteration, or installation from scratch, of communications infrastructure which enable fibre optic cabling up to the customer's home, without constraints or delays resulting from the required approval of the condominium in the case of horizontal property buildings. Furthermore, according to the operator, the amendment of existing infrastructure, or its installation from scratch, should always be carried out without restricting the possibility of fibre optics or equipment being installed operators competing with the first to complete installation.

Regarding the management of infrastructure in buildings, VODAFONE suggests the adoption of mechanisms that lead to the mandatory sharing of infrastructure by the telecommunications operators, which should install sufficient capacity, suggesting that the first operator to install fibre optic in a given building is required to put a box (waterproof for outdoor installation) with capacity to house the items listed in its response to the above question and for:

- the use of entry tubing superior to those currently in force in ITED; and
- make connections to each of the building's independent units in the most technically appropriate manner.

Position of ICP-ANACOM

The general position among respondents is that a review of the legal and technical rules of the ITED regime require urgent review, in light of the view that this regime is insufficient and inadequate given the current and real needs of operators, especially in terms of conditions of access, regardless of year of the building's construction. In terms of the legal rules, in general it is proposed that legislation should enshrine the right of access to the infrastructure of the building by operators registered with ICP-ANACOM in order to connect their networks to potential customers³³², while at the same time simplifying and streamlining the procedures governing the granting of permission by condominiums for the installation of communications

³³² Even though ZON states that the current rules already facilitate the installation of optical fibre in new or reconstructed buildings, with an "imposition" on condominiums, under certain conditions, of this access.

infrastructure. In addition, important technical issues are raised and specific proposals put forward for a revision of the ITED manual:

- coordinated access to conduits and the re-use of manholes (including water, electricity or sewers) in the buildings, whereas external cabling for older building would not be an option;
- mandatory cabling in new buildings;
- synergies with civil construction work performed by other utilities, with formal construction rules;
- guarantee the existence of empty conduits for subsequent use of the customer or service provider;
- existence of quality common areas, even in older buildings (including additional space in the ATE - ex-RGE);
- pre-installation of AC power supply for permanent use, according to the authorisation of the condominium;
- installation of an ODF in the ATE with capacity for terminating a fibre optic pair for each independent unit of the building;
- telecom riser with provision for the inclusion of fibre optic from the ODF to all independent units;
- sockets in all independent units with coaxial and data terminals³³³.

Assuming that there probably won't be strong interest in FTTB solutions (micro-DSLAM in the basement, maintaining the copper wiring), which have drawbacks (such as the need for power and space for a DSLAM)³³⁴ and limitations of capacity in the medium term, in the medium and long term it is expected that fibre optic will reach as far as (the home of) each customer.

For this scenario of extending fibre optic to the home to become a reality in the shortest possible time, ICP-ANACOM will seek to minimize or eliminate the "vertical barriers", i.e., any restrictions on access by any operator to the "vertical infrastructure" of buildings for the installation of fibre optic solutions up to the homes of their customers.

To this purpose, ICP-ANACOM is conducting a comprehensive examination of all the issues and measures to be proposed and adopted, both in technical and legislative terms (in this context, proposals have been forwarded to the Government), in order to harmonize and

³³³ According to SONAECOM, training to be undertaken with respect ITED should include a component to raise awareness of new IP-TV technologies, so that designers, technicians and developers are aware of the above requirements.

³³⁴ In the case of FTTB solutions, it seems reasonable to assume that only one operator can place a DSLAM/active equipment in the building, mainly for technical reasons (of space and equipment power supply).

simplify the system governing access by operators to all buildings, new-build (ITED) as well as older buildings and to adapt ITED so that it is technically suitable for supporting fibre optic technologies. From the legislative point of view there was particular analysis of issues related to access to the private domain, especially with respect the horizontal property regime.

This is a concern shared by the Government, which, in the Council of Ministers, has determined the development of measures to "*eliminate barriers to the roll-out of optical solutions in connection with next generation networks in buildings, including the introduction of the appropriate changes to the technical regulations currently in force (namely ITED and ITUR).*" whereas it falls to ICP-ANACOM, according to the same determination, to "*evaluate solutions aimed at eliminating or attenuating vertical barriers to the roll out of fibre optics, as well as solutions for sharing/lending infrastructure on buildings, which prevent the first operator to monopolize the access to them.*".

With respect to sharing, the draft Recommendation also sets out that, in a scenario of development of FTTH solutions, duplication of infrastructure should be avoided where it is impractical or undesirable, such as infrastructure inside buildings. In this case, the European Commission states that regulators should facilitate cooperation with regard to the installation and sharing of infrastructure inside buildings, providing end-users with options in choosing their service provider³³⁵. According to the European Commission, regulators should therefore facilitate and promote the sharing of "vertical" infrastructure in order to prevent undesirable multiple installations.

Indeed, the intervention of ICP-ANACOM has already been requested in situations where multiple operators (e.g. cable) want to offer services in the same building and there are restrictions in terms of available infrastructure. With sharing, inefficient duplication of infrastructure and potential "conflicts" in case of capacity constraints can be avoided. Meanwhile, assuming that customers would not be willing to receive (more) various cables³³⁶, the first operator to reach a building could monopolise it, without competition in the provision of NGA based services.

In this context, it would be desirable to install optical fibre to home, but not multiple installations. Indeed, with respect to FTTH solutions, the sharing of vertical infrastructure should be favoured, even so far as enabling the costs of first operator which extends the fibre to this building to be effectively shared "from the outset". In any case, it is necessary to

³³⁵ Whereas 7, page 4, Paragraph 13, page 6 and para 14, page 7: "*In a Fibre to the Home (FTTH) context (...) duplication of infrastructure should be avoided where it is impractical or undesirable such as in-building wiring. (...) NRAs should facilitate cooperation regarding the roll-out and sharing of NGA infrastructure within buildings in order to enable end-users to have competitive choice. (...) NRAs should take into account that multiple physical access deployments may be impractical or undesirable within buildings*".

³³⁶ Or, even where this occurs, the cost of extending fibre optic to all the independent units of a building (and its interior) is not negligible.

provide conditions for the entry of additional fibre cables into the building and space, for example, for an ODF.

Accordingly, ICP-ANACOM's intervention in this area can come at two levels, establishing effective, transparent and non discriminatory rules for the desirable sharing of "vertical" infrastructure:

1. In the proposal of legislative measures made to the Government, especially in respect of the application of the ITED regime (including the extension of fibre optic to old buildings), the implement of the new ITUR regime and the horizontal property regime (simplification and streamlining of procedures at the level of condominiums).
2. In the revision of the ITED Manual, seeking to adjust it at a technical level to meet the challenges of extending fibre optic up to the buildings and homes of customers (including inside).

2.2.13 Reference Unbundling Offer (RUO)

Question 42: Do you consider that the problems identified and remedied in respect of the RUO have analogy with those relating to access in a fibre optic network?

PT takes the position that the problems identified and remedied in respect of the RUO are specific to this offer, and that it does yet know the models of construction and of the wholesale offers supported on the fibre optic network.

CEGEA considers that the problems identified in respect of the RUO have analogy with the problems which may exist with respect to access to a fibre optic network, especially if the solution adopted by operators which invest in NGA is of the FTTH type³³⁷.

ONI agrees with the analogy and considers that the experience gained through the RUO must be used to achieve a better definition of an offer of fibre optic loop unbundling.

ZON also gave an affirmative response to the question, commenting, for example, that the absence of an offer which covered the entirety of the fibre optic could give grounds to the adoption of a single network model.

The problems identified in respect of the RUO may, in the opinion of SONAECOM have parallels in the development of a fibre optic network, especially given the architecture of the network which, according to all indications, will be of the GPON type. The difference, according to the operator, could be in the fact of there being greater capillary in the network and, in particular, in respect of the need to redefine the concept of bottlenecks associated with the last mile. The experience of SONAECOM does not point to the conclusion that all the problems identified have been overcome by the RUO. SONAECOM draws attention to

³³⁷ CEGEA also refers to its response to question 26.

the diligence necessary in the redefinition of the regulation and the possible extension of the RUO to encompass the fibre optic network. In this regard, it recalls some problems which it identified in its response to question 6:

- discriminatory access in favour of PT to the services in question, giving it a competitive advantage in the launch of retail offers;
- omission of record information required by beneficiaries in the preparation of their business plans;
- absence of levels of service which are adequate for market needs;
- absence of a compensation system providing a deterrent to non-compliance;
- excessively bureaucratic procedures, whose automation was enacted without the beneficiary having knowledge of its timetable and with successive and unexpected changes (involving increased costs and delays in terms of development);
- process of excessively detailed forecasts whose proper formulation is prevented by the absence of reliable record information; and
- ambiguous wording open to different interpretations which prevents effective regulatory certainty.

VODAFONE also considers that the RUO involves a complex and lengthy process, facing significant constraints with respect to its development. The problems in question, according to VODAFONE, are evident along the length of the unbundling process from the time of identifying exchanges for co-installation until the time of loop unbundling and confirmation of the availability of service to the end-user, in particular:

- the lack of information on remote units;
- the constraints of space and power in PTC exchanges;
- the lack of effective penalties which encourage compliance with the agreed levels of service.

Regarding the actual unbundling process, VODAFONE considers that situations of non-compliance by PTC persist with regard to the applicability of the procedures defined in the RUO, including:

- delays in the unbundling and installation of the local loop;
- incorrect unbundling of loops which leaves the end-customer without service;
- incomplete installations which cause delays in supplying the service to the end-customer; and
- undue closures of work orders by PTC technicians, during the unbundling/installation of the local loop, causing the replacement of the request.

According to VODAFONE, the implementation of NGA will give rise to new problems which are not addressed by the principles established in the current RUO or by the regulatory supervision of this offer. In this regard, it states that, due to the fact that NGA, in contrast to existing copper networks, may comprise different network solutions within the same country (FTTCab in some places, FTTH in others, and with PON solutions or point-to-point solutions), a reference offer which provides for access to fibre will need to be more comprehensive in terms of the possible scenarios for NGA structuring and effectiveness in terms of the solutions for overcoming the problems raised by each access scenario.

Question 43: Do you consider that specific measures are needed to protect investments based on the RUO? If so why and what?

Despite already incorporating fibre optic in the local network, PT reported that it has neither discontinued nor expressed any intention to adopt a policy of "*phase out*" with respect of their MDFs (LLU). If there are grounds for such action in the future, resulting from options for the development of its network and efficiency of investment to meet market needs, PT proposes that it will inform the beneficiary operators of the RUO affected with due prior notice, agreeing wherever possible on timetables in the event that it becomes necessary to relocate equipment which is co-installed in its exchanges³³⁸.

PT therefore considers that any regulatory measures designed to protect investments based on the RUO should not be taken if they in any way delay or prevent the migration of its network to NGA in a given area, which PT claims would create new barriers to investment and NGA development, with the additional aggravating factor that this would impact only one operator (PT). Such measures should also not force it to maintain a network or local exchange which has become redundant (incurring the costs of maintaining two parallel networks).

PT is aware that investment in FTTCab/FTTH by the incumbent impacts or may impact competitors which base the provision of their services on LLU. But this is, according to PT, the natural consequence of any process of evolution leading to technological obsolescence.

FCCN considers that no specific measures are necessary to protect investments made in the RUO. On this issue, it indicates that the imposition of measures with this objective would limit NGA innovation, whereas the decision to invest belongs to each of the operators.

However CEGA considers to the contrary that specific measure are necessary to protect investments made in respect of the RUO, in order that alternative operators will be able to compete with the incumbent operator³³⁹.

³³⁸ PT notes in this respect the position taken by the Spanish Regulator in the document "Principios y líneas maestras de la futura regulación de las redes de acceso de nueva generación".

³³⁹ CEGA mentions it is foreseeable that investments made by the incumbent operator have already been recovered.

According to ONI additional measures are needed which were mentioned in its response to previous questions.

SONAECOM also answers this question in the affirmative, whereas the specific measures in question were detailed in its response to question 13.

VODAFONE supports the need to update the RUO, with immediate effect, in order to minimize the negative impact in terms of the accountability which the actions of PT have in the market with respect to the remote enabling of significant parts of its network with no guarantee of replication supported in a wholesale offer under the RUO. It notes, however, that this review does not go far enough and that it is essential to impose additional obligations with respect to NGA.

This suggestion has, according to VODAFONE, the aim of finding a regulatory balance which, on the one hand, avoids competitive discontinuity, allowing return on investments made under efficient terms and, on the other, does not focus on artificially ensuring the survival of entities in the market whose activity will be unsustainable in the new market structure. Accordingly, VODAFONE considers that it is necessary to enact the following obligations, with respect to PT:

- Transparency in projects which impact the exchanges where alternative operators are co-installed: According to VODAFONE, PT should be required to notify the beneficiaries of RUO and ICP-ANACOM, with a necessary period of prior notice, regarding their plans for the roll-out of NGA or changes to the network affecting the continuity of the exchanges where its competitors are co-installed, allowing the adjustment of investment to the new network topology and avoiding decisions that adversely affect the investment capacity of competitors.
- Continuity in the exchanges: As is argued in its response to question 20, a phased transition period should be established which would apply to areas and exchanges where alternative operators are co-installed.

This period is based on the one hand, on providing continuity for existing infrastructure for a reasonable time, which period VODAFONE proposes should not be less than 5 years (and not directly connected to any given strategy of PT with respect to NGA roll-out) and on the other, on ensuring a reasonable return on investments already made by co-installed operators, in the absence of which an environment of uncertainty would be created which would discourage future investment.

Position of ICP-ANACOM

The importance of LLU in the development of competition in markets (including but not limited to broadband) has been repeatedly emphasized, contributing to greater innovation in offers (e.g. bandwidth of 24 Mbps and provision of IP-TV services) and better retail prices.

The developments which have taken place in respect of LLU and also in terms of coverage of supported services, currently reaching about 60% of the population (thereby providing choice in terms of quality of service and price) are relatively recent and were accomplished thanks to increased investment in network infrastructure by various beneficiary operators of the RUO. It should therefore be sought to guarantee the profitability of this investment, according to the legitimate expectations of these operators, which decided to advance subsequent to the establishment of a stable and predictable regulatory framework³⁴⁰. However, even in a scenario of significant alteration to the technological environment, motivated by the development of NGA, ICP-ANACOM is bound to guarantee the same stability and predictability in its regulatory approach to the market, especially given that a significant part of the broadband market is dependent on the RUO.

In this respect, and in line with the analysis of Market 4, the position is taken that it is necessary to maintain the current wholesale offer, with adaptations arising from said analysis, leading to a continuation of the availability of exchanges and MDFs for co-installation and of loops which are eligible for unbundling.

In this respect, the draft recommendation sets out that in an implementation scenario of FTTCab solutions, existing obligations related to Market 4 should be maintained and not be undone by changes in the network's structure or topology³⁴¹.

According to PT, the problems of the RUO (which in their view have been "overcome") remain specific to this offer. In contrast, the remaining operators responding to the consultation considered that there is an analogy between these problems and possible problems of access to a fibre optic network, especially if of the type FTTH (PON). Additionally, VODAFONE and SONAECOM draw attention to the persistence of various problems associated with LLU³⁴².

In light of the market's evolution and accumulated experience, and given the issues raised here, as well as communications received from operators, which highlight certain difficulties in putting some RUO processes into operation, ICP-ANACOM has analyzed possible

³⁴⁰ Since all the beneficiary operators decided to invest most heavily in their own infrastructure, "climbing the investment ladder" in the light of offers based on the RAPT ("bitstream"), thereby expecting to ensure, over the medium-long term, to derive a reasonable return on such investments in their own network and in co-installation in hundreds of MDFs.

³⁴¹ See para 7, page 4: "*Existing SMP obligations in relation to Market 4 will continue and should not be undone by changes to the existing network structure or topology*".

³⁴² In particular, access by PT to the services in question, competitively advantageous in the launch of retail offers; the lack of transparency in record information (e.g. on remote units); inadequate levels of service and compensation system for non-compliance; constraints on co-installation; lengthy and complex processes (and problems with automation); forecasting processes which are too detailed or delays and errors in the unbundling and/or installation of the loop.

improvements to this offer in respect of a wide range of issues³⁴³, the results of which will be included in an upcoming Determination, soon to be placed in consultation.

However, while these are current issues, they are not focused on NGA development. In this respect, PT states that it has not ("yet") expressed any intention to adopt a policy of decommissioning their MDFs (LLU). If there are grounds for such action in the future, resulting from options for the development of its network and efficiency of investment to meet market needs, PT proposes that it will inform the affected beneficiary operators of the RUO with due prior notice.

ICP-ANACOM notes PT's position that it has no intention, at least in the short term, to introduce disruptions at the level of LLU. In the event that PT, in pursuit of its network development plans, considers it necessary to make effective changes which impact the architecture of the access network (in copper), this Authority takes the position that PT shall, in addition to "*due prior notice*", with a notice period which is proportional to the impact and which can be up to three years³⁴⁴, be required to reach agreement - essential in the case of MDF decommissioning - with beneficiary operators, on the planning and technical conditions where the relocation of equipment (already) co-installed in the exchanges is necessary and on any migration of accesses/customers.

It is also the position of ICP-ANACOM that it is desirable that the conditions for MDF decommissioning and the migration of co-installed beneficiary equipment be agreed upon by the industry, without prejudice to the intervention of this Authority, in the event that the parties fail to reach such an agreement.

In this respect, the draft recommendation sets out that regulators should ensure appropriate transitional measures, to allow alternative operators to adjust their strategies to the new network structure³⁴⁵ and that in cases where an operator with SMP intends to replace part of its copper access network in copper with fibre optic, there must be agreement between this operator and the operators concerned in a reasonable time. This agreement shall provide for the migration of the current access to access in the new network structure (the regulators shall, in defining specific obligations, such as the deadline for the migration or the technical features to be maintained with respect to the copper accesses during the transition period,

³⁴³ Including: co-installation of services; signal transport and internal cables; access to exchanges; constraints in exchanges; forecast plans; eligibility - information of coverage (and information on specific characteristics of local loops); services unbundling (incorrect unbundling and inactive loops); levels of service, synchronization of portability with the transfer of loops between alternative operators; withdrawal period; changes in access network and pricing.

³⁴⁴ See, in this respect, the position of ICP-ANACOM set out in section "2.2.5 Evolution in Portugal" of the present report.

³⁴⁵ See para 9, page 4: "*appropriate transitional arrangements are in place, with a view to enabling alternative operators to adjust their business strategies to the changed network structure (u2026)*".

consider explicitly the implications for competition resulting from the replacement of the network copper pairs with fibre optic)³⁴⁶.

The position is therefore taken that LLU beneficiaries should have access to more information which is essential to the development of their networks and offers and which has a direct impact on their investment decisions, ensuring a more transparent, efficient and predictable process, particularly with respect to the development of NGA.

Additionally, consideration must be given to the impact on the "conditions of market accountability" with respect to the changes due to take (or which are already taking) place in terms of the access networks, with the creation of new access points, with remote enabling of various nodes and a "relocation" of some of the loops of various exchanges/MDFs. It is noted that new APs may be set up in street cabinets (or, for example, in a condominium), without alternative operators being able, in practice, to choose to (co)install at this point, either for reasons of economic viability, or because the unbundling of the sub-loop unbundling and co-installation at this level are currently not "in operation" in the RUO, i.e., even though generally covered in this offer, not with sufficient detail.

As already mentioned, it is essential to seek balance between the apparently conflicting interests of promoting investment in new networks and maintaining the expectation of operators with respect to deriving a return from investments already made in LLU. ICP-ANACOM obviously continues to remain focused on promoting competition, whereby it is desirable that, at a minimum, that there is no loss to the current competitive dynamic of the market.

This position is consistent with that of the European Commission as set out in the explanatory note in annex to the draft Recommendation³⁴⁷ which states that while FTTCab can be deployed quite quickly, at the same time considerable difficulties may arise for alternative operators seeking access at street cabinet level. Therefore, if there is identification of an operator with SMP in the relevant market, NRAs will need to ensure, at least in the short term, that the local loop offer is maintained, ensuring proper migration from local loop unbundling to sub-loop unbundling or to any other solution.

In any case, since PT is designated as an undertaking with SMP in the relevant access markets, in respect of the market analyses which have been carried out, the ex-ante

³⁴⁶ See para 16, page 7: "*Where an SMP operator intends to replace part of its existing copper access network with fibre, (...) an agreement is reached between the SMP operator and access seekers within a specified deadline on an appropriate migration path from the prevailing access remedies to access under the new network structure. In determining the specific obligations such as the timing and technical functionalities to be maintained over copper during the transition period, the NRA should explicitly assess the implications for competition of decommissioning the copper network*".

³⁴⁷ See page 15: "*While FTTN can be deployed quite quickly, at the same time considerable difficulties may arise for access seekers deploying infrastructure at the street cabinet. Therefore, if there is a finding of SMP on the relevant market, at least in the short term, NRAs will need to ensure that local loop unbundling is maintained with a view to ensuring the continuity of migration from local loop unbundling to sub-loop unbundling or to any other chosen business model*".

obligations of access, transparency and non discrimination, with impact on the reference offer, in addition to other obligations, shall be maintained.

Accordingly, consideration is being given to advancing with alterations to the RUO, especially in terms of:

- provision of additional information at the level of coverage, number and locations of the (access) points of the PT network, especially in the context of FTTCab type solutions;
- definition of procedures to be followed in case of profound changes at the level of the network structure (which should have a reasonable period of notice)³⁴⁸;
- possible differentiation and specification of technical conditions depending on geography, i.e., according to the geographic segmentation arising from market analyses (e.g., different conditions at the level of co-installation and backhaul³⁴⁹);
- putting the unbundling of the sub-local loop into operation (processes, co-installation, connection to the street cabinets - backhaul, among others), implementation of procedures and quality of service requirements, through SLAs, in the event that PT develops FTTCab type solutions on a wide scale and provided that there are operators which are clearly interested in this kind of wholesale product³⁵⁰;
- definition of procedures for the migration of current wholesale products to any future NGA products, such as the unbundling of the local sub-loop or of the bitstream type;
- definition of the process and effective migration of the end-customers of the operators which choose or which have to migrate to a new wholesale product or location (e.g. in case of the decommissioning of an MDF), seeking always trying to minimize the impact of network alterations on active services, i.e., with minimal disruption to service.

ICP-ANACOM recognises that putting the unbundling of the local sub-loop (in FTTCab type solutions) into operation is a complex matter and that it is necessary for several conditions to be in place if such an obligation is to be feasible, such as the possibility of co-installation (which can be constrained by external factors, such as local authority permits), the existence of conduit capacity and/or a backhaul offer (including through dark fibre). In addition, there are limitations, even with VDSL2, associated with the length of the sub-loops.

Economic issues cannot be forgotten, and, in addition to costs associated with (new or shared) street cabinets and their fibre optic connection, consideration must be given to the significant reduction in the number of potential customers per node (compared to the current number) and thus the potentially lower return generated through this solution.

³⁴⁸ See position of ICP-ANACOM provided in section 2.2.5.

³⁴⁹ For example, with different prices, possibly lower for more remote and/or non-competitive areas.

³⁵⁰ According to the "system" for making expressions of interest as defined in the position expressed in section 2.2.5.

In less densely populated and/or more remote areas, these constraints will be felt more strongly, and it may not be feasible to make use of this wholesale product. ICP-ANACOM accordingly takes the position that consideration should be given to the possibility of another wholesale capacity offer i.e., a solution of the "bitstream" or "virtual network access" type which will probably be more appropriate for situations in which an unbundling solution does not appear technical and/or economically viable, either of copper, or, possibly, optical fibre. This issue is discussed in further detail in the following section.

2.2.14 The reference offer for the supply of wholesale broadband access (RAPT)

Question 44: What changes do you consider are necessary in the wholesale broadband offer, in order to guarantee high coverage and capacity for differentiation? Do you consider it appropriate to have local access at the level of DSLAM and/or Ethernet interface?

This type of offer would imply, according to PT, providing dedicated DSLAM per beneficiary operator, which is economically unreasonable because of their number (12), not providing an optimisation of resources and investment, but rather an increase in costs^{351,352}.

On the demand side, PT states that the ATM offer and the Ethernet offer recently made 28 and 26 regional access points available respectively. However, PT reports that there was no relevant interest from other operators with respect to these offers, which have a high unbundling level, whereby, in the view of this operator, an increase does not appear necessary. Indeed, PT states that the provision of a national broadband network for the retail operators demonstrates its efforts towards the development of the information society, and yet, according to the operator, this effort to provide coverage was not received by other operators with the interest that had been expected.

Furthermore, PT argues that the purposes of the RAPT wholesale offers (which aims to address the needs of operators without their own infrastructure) and the RUO shall not overlap, which would happen with the approach of access to the DSLAM at the level of the RAPT to LLU.

PT states that there are two distinct realities in Portugal: (i) the major operators (which focus on infrastructure supported through the RUO and/or RCAO) and (ii) the remaining operators (who are unable to achieve optimal economies of scale and minimum critical mass and who suffer fundamental limitations at network and infrastructure level and typically seek "turn-key" type solutions from PT). In this context, PT considers that its current portfolio of offers effectively addresses the diverse range of operator needs, enabling them to provide national retail offers with capacity for differentiation. Accordingly, PT argues that a potential offer of

³⁵¹ Additionally, according to PT, all the complexity in terms of spaces, processes, systems, and (non-)optimization of DSLAM resources are factors which would act as an disincentive to operators.

³⁵² PT states that the RAPT offer provides a wide range of service options, but not unlimited options, due to the fact that the platform is shared by several operators and it is not feasible to build a platform for each of the offer's 12 beneficiary operators.

local access in terms of the DSLAM and/or Ethernet interface is economically inefficient and would not add real value to the alternatives already existing in the market.

COLT considers the proposals as being a good start, but takes view that they must be adapted to the existing reality, with the current wholesale offers subjected to a comprehensive review.

According to ONI, access at the level of the DSLAM and the Ethernet interface are important steps in the evolution of the wholesale broadband offer. According to the operator, additional measures which could be taken include the definition of service classes with different quality levels for different types of traffic, symmetric speeds and 1:1 contention rates³⁵³.

ZON states that it does not have enough information to respond to this question.

So that these offers have a useful effect, it is necessary, according to SONAECOM, that their evolution is followed in order to allow the replication of PT's base offers, as well as the maintenance of the capacity for innovation among the supported operators. To this purpose, SONAECOM considers that the offers should allow the differentiation of traffic type, enabling prioritization according to the type of service provided³⁵⁴. This capability already exists, in part, in the current bitstream offer, insofar as specific virtual channels are created by service, but the speeds and other technical parameters still prevent a quality triple-play offer. Additionally, SONAECOM advocates that the technological efficiency of the offer should be ensured, requiring a migration to Ethernet and, furthermore, economic efficiency, which requires the removal of existing artificial barriers to the development of economies of scale³⁵⁵, as well as the figure of port reservation, which makes efficient use by the beneficiaries unviable.

With regard to DSLAM access, SONAECOM considers that with the information conveyed in respect of the consultation on the existence of more than 10 thousand street cabinets on PTC's network, its practical effect will tend to be reduced to the extent that it always involves an initial cost associated with the horizontal network (backhaul up to the street cabinet) and the possible co-installation of equipment necessary for interconnection. Accordingly, SONAECOM considers that the resulting benefits are limited. It considers, however, that the increase in regional interconnection points is relevant, precisely as a way of encouraging a greater commitment from operators to build networks³⁵⁶.

In general, these are, according to SONAECOM, the main adjustments required, but it considers that the relevant aspects, in particular with regard to costs, should be discussed in

³⁵³ This, according to ONI, would enable operators to have appropriate control over the retail supply.

³⁵⁴ That is, it should be possible to provide packaged services - including television - without this resulting in degradation of the quality of the service which is more demanding in terms of use.

³⁵⁵ In particular, capacity restrictions persist in ATM virtual connections.

³⁵⁶ SONAECOM considers that the existence of distribution networks which are already of a reasonably size is a factor which has relevance in energising the market and the differentiation of retail offers.

detail later in the consultation process and in coordination with offers to the upstream and downstream.

According to VODAFONE, the main restriction in the current bitstream offer is the fact that it is economically impossible for alternative operators to construct commercial offers to compete with those placed on the market by PT, due to scale, geographical presence and scope of the offer itself in the case of the recent Ethernet aggregation offer. VODAFONE considers it serious that PTC has not shown willingness to extend Ethernet aggregation to the national IP offer, with no provision for extending the coverage of the exchange areas with Ethernet technology to areas sparsely covered by LLU offers. The operator therefore concludes that the bitstream offer, due to its pricing structure and the fact that, in its view, it allows margin squeeze, does not contribute to the geographical expansion of the alternative operators throughout the national territory, leading even to the removal of competition and the closing up of the market.

VODAFONE additionally argues that the retail prices of some of PT's offers (including the SAPO ADSL offer without telephone subscription) have low margins. Accordingly, the main alteration suggested by VODAFONE entails the replacement of the obligation of prior notification of any commercial offer directed at the retail market, whereby wholesale conditions which allow alternative operators to compete with PT must always be ensured. VODAFONE further argues that ICP-ANACOM should conduct an urgent review of the retail margins currently practised by PT.

Question 45: Do you consider that the retail offers supported over the (future) RAPT should be able to compete, in terms of features and coverage, with offers supported over unbundled loops? For example, should the RAPT support the offer of IP-TV services by operators?

PT states that the RAPT offer allows operators to provide retail offers of ADSL based access to the Internet and data networks, and has incorporated a range of different features over recent years, without distorting its original purpose. This offer is supported on a platform with resources shared between the operators, placing, according to PT, limitations to the extension and differentiation of services which are incompatible, in terms of features, with offers supported over unbundled loops³⁵⁷. In PT's view, the issue of coverage is not critical, given that operators have coverage in their retail offers supported over the local loop which is limited when compared with those using the RAPT offer.

With respect to the support of IP-TV services by the RAPT offer, PT states that the development and deployment of integrated wholesale solutions for IP-TV on a multi-operator platform is technically³⁵⁸ and economically unfeasible, and that no wholesale offer of this

³⁵⁷ This does mean that PT does not argue that the retail offers (including those of PT) supported over the RAPT continue to be able to compete with offers supported over local loops.

³⁵⁸ With restrictions, according to PT, at the level of capacity/bandwidth/QoS and security mechanisms.

type exists anywhere in the world. Additionally, PT advocates the need to identify demand for these services and to ascertain whether the operators would be interested in subscribing to this offer. According to PT, practice has shown that IP-TV retail offers are supported over the operators' own infrastructure or where this does not exist, over the wholesale services of infrastructure (RUO, co-installation and RCAO), whereas PT has no record of any sustained request to incorporate such features in the RAPT offer.

In conclusion, PT takes the position that it is excessive and disproportionate to alter the conditions of the bitstream offer to support offers with greater complexity, such as solutions for IP-TV.

COLT argues that the offers should enable the support of any services which can fulfil the needs of consumers.

Offers supported over the future RAPT should, according to ONI, tend to offer the same type of services included in the retail offers of the dominant operator in a situation where there is no functional separation.

According to ZON, the RAPT offer is categorised by the provision of services of public interest/utility such as the fixed telephone service and Internet access. The remaining services should not, according to ZON, be offered in the future version of the wholesale offer, since they do not represent such an interest/utility. In particular, ZON considers that the public interest/utility of the television offers is ensured by the (future) platform of digital terrestrial television.

As mentioned in its responses to previous questions, SONAECOM considers that, at least for entry products, this capacity for replication must be ensured, whereas television will increasingly become a basic element of any offer of this type, whereby its inclusion is justified. Again, the logic is, according to that operator, that these deals are an intermediate rung on the investment ladder to be scaled by operators wishing to invest in the national market, whereby this will be an excellent entry offer. According to the position taken by SONAECOM, the cases referred to in questions 13 and 46 are exceptions.

According to VODAFONE wholesale offers should allow third parties competing with PT in the retail market to replicate its commercial offers, with differentiation in terms of price and innovation in services. In this regard, VODAFONE also considers that it is essential to ensure that the retail units of PT do not enjoy better conditions of service, assistance or maintenance than those which are provided to wholesale customers and which may result in higher levels of quality. Considering the growing importance attributed to triple-play offers by the market and considering that these will be an important factor in retaining the loyalty of the customer base, that fact that it is impossible for alternative operators to offer IP-TV over the RAPT offer represents, in the opinion of VODAFONE, a distortion of the market that benefits PT, distorting competition and barring competitors from the market.

Question 46: In the context of an FTTCab scenario, which specific components should be considered in any possible VDSL "bitstream" offer?

With respect to the new emerging technologies such as VDSL, PT states that its adoption by any operator has profound implications on several levels, particularly in terms of investment in re-equipping the DSLAMs. xDSL technologies (including VDSL) have, according to PT, limitations of speed, and are heavily dependent on the availability of the copper route. PT states that there is public knowledge as to the limited availability of alternatives at the level of terminal equipment. The topic of VDSL will therefore, according to PT, need to be necessarily and duly considered at a strategic level as part of the process of evaluating NGA architecture³⁵⁹.

PT recalls that the bitstream offers have generated limited interest from operators, despite their features, whereby the provision of any new bitstream offers in respect of the RAPT or at other levels, should be supported, among other things, by firm demand and interest from its customers.

If the case of the ATM offer, PT warns that maintaining it through regulatory imposition may call into question the future evolution of certain components of its network³⁶⁰. In these circumstances, PT considers that no bitstream offer should be established using VDSL. As stated with respect to virtual unbundling solutions, PT submits that the operators have the conduit access offer, which allows them to build their own solutions with fibre optic integration.

CEGA considers that it is necessary to ensure levels of quality of service which allow the competing operators to implement offers with a high degree of substitutability with respect to the offer made over dark fibre or over fibre optic infrastructure³⁶¹.

According to COLT, the scenario to be considered should be FTTH/B and not FTTCab.

ONI considers that it should be ensured that all classes of service provided by the dominant operator in its retail offerings are also available in the bitstream offer, with guarantee of the same SLAs and quality of service.

ZON states that it does not have enough information to respond to this question.

This case is, for SONAECOM, of paradigm importance in terms of the support of triple-play offers. This operator considers it essential that this type of offer includes television services, especially since this option may be particularly relevant where PTC has established street cabinets/RU/AP without giving sufficient prior notice to the beneficiary operators of the RUO

³⁵⁹ PT believes that this analysis must be conducted on a comparative basis with other alternatives of access, particularly in terms of scalability, being future-proof and the costs involved, as well in terms of the regulatory environment.

³⁶⁰ In the context of NGA, PT submits that any wholesale bitstream offers should, as a rule, be supported on Ethernet (level 2 or 3) and not through ATM. This is, according to this operator, one of the specific criticisms that should be observed in NGA.

³⁶¹ CEGEA also refers also to its response to question 19.

or without conditions of replication being ensured. However, it draws attention to the fact that this situation is also relevant in an FTTH scenario, because also in this case, it is evident that MDFs which were previously subject to unbundling have been decommissioned and, as a consequence, issues are also raised with respect to the stability of the offers thereto provided to the end-customers of the beneficiaries. It therefore reiterates the arguments of its response to question 13, i.e. that in these cases the offer should allow replication (and accompaniment) of the offers supplied by PT to customers served by this network node.

In the scenario of an FTTCab/VDSL offer in *bitstream* by PTC, account should be taken, according to VODAFONE, of the following technical and pricing factors:

- for Ethernet access there should be agreement on mechanisms of QoS to be provided and on how PTC will ensure such levels in their DSLAM (construction of VLAN, guarantee of non-congestion, etc.).
- session establishment mechanisms should be agreed;
- a sufficient number of aggregate accesses should be defined (e.g. those currently existing as part of the regional Ethernet services);
- the location of street cabinets and the respective plans for entering them into service should be made known to the alternative operators at least 6 months in advance, so that these operators can prepare geo-targeted marketing campaigns, on an equal footing with PT;
- PTC should be required to communicate, not only the location of street cabinets, but also the numbers and addresses of the lines covered by the cabinet and the estimated length of the cable; and
- in terms of pricing, account must be taken of the fact that the rental of access will have a value which is substantially below that of the RAPT offer, since it is based on shorter loops and, therefore, with a clearly lower level of OPEX.

Position of ICP-ANACOM

ICP-ANACOM recognizes that certain modifications to the RAPT offer, including the introduction of aggregated ATM access and regional aggregation, have been used by operators far less than expected by this Authority, especially given that these changes were requested by the main alternative operators³⁶², in order to allow greater independence and innovation in the provision of their services compared to PT's retail broadband offer³⁶³.

³⁶² It is noted that ZON, currently PT's main competitor in the provision of broadband services and potential beneficiary of RAPT in areas not covered by its cable network, was until very recently part of Grupo PT, using this offer only residually.

³⁶³ In practice, the forerunner of the effort of 100% coverage by the national broadband network by PT, an occurrence which ICP-ANACOM recognises is important to the broad availability of the broadband Internet access service.

From a point of view of greater independence of the offers to the market, note is made of the more specific and definitive targeting of LLU by various operators, which allows the development of offers which are totally unbundled and clearly differentiated e.g. *triple-play*. On the other hand, the difficulties in achieving wider, and preferably national, coverage of these services were highlighted, with the conditions of viability for Disaggregation / co-installation examined from a technical (e.g. longer loops in remote areas) and economic (lower number of potential customers per MDF) point of view.

Even though the technical solutions to be developed for the deployment of NGA are not known, it is expected that the current difficulties faced by operators in extending the coverage of their networks and services (supported by LLU) beyond the most densely populated/urban areas will persist and even increase in the future, in a scenario of widespread evolution to fibre optic networks.

ICP-ANACOM seeks and will seek to promote competition in the network infrastructure, at the highest level possible of the "investment ladder", to the extent that "efficient investments" in networks are viable. If in certain circumstances the presence of (more than) one fibre optic network may not be viable, i.e., competition between networks, particularly in more remote rural areas, it is envisaged from the outset that it is necessary to provide for the possibility that operators which are manifestly and effectively interested in offering their services in these areas can do so through a wholesale operator or the holder of the single network infrastructure in these same areas, where this type of situation is evident, in which the dominant operator - with SMP - in the access market will likely play a part.

In these circumstances, regardless of technological evolution, it is expected that a wholesale reference offer of broadband access will be maintained with broad coverage, especially in non-competitive areas, as is mentioned in the draft Recommendation: the product market comprising Market 5 (as defined in the Recommendation) should not be altered due to changes in terms of network technologies³⁶⁴. (...) If the existence of SMP is identified in Market 5, the obligations of the supply of wholesale broadband access - in a context of the deployment of both FTTH and FTTCab solutions - should be maintained for the existing services and their (chain) substitutes³⁶⁵.

Meanwhile, the evolution of the offer in technical terms will no longer be independent of technological change, including the suitability of services and capabilities offered by the new

³⁶⁴ See para 11, page 4: "*The product market that makes up Market 5 as defined in the Recommendation on Relevant Markets is unlikely to change as a result of a change to the network technology*".

³⁶⁵ See para 23, page 8: "*Where SMP is found on Market 5, wholesale broadband access remedies - in the context of the deployment of both FTTH and FTT - should be maintained for the existing services and chain substitutes which constitute Market 5*".

networks³⁶⁶. In this context it falls, for example, to a possible extension of coverage at Ethernet level (or actual replacement of ATM technology), as will be examined later.

For the reasons given above, in a scenario of the type FTTCab, access at the level of street cabinet may be very difficult or even impossible, whereby, under the same circumstances, wholesale access at the level of DSLAM - to be installed in street cabinets - would also lack viability, requiring a "switching" and transmission solution (to be deployed in the actual cabinet), with the connection of backhaul (also per cabinet) under conditions similar to those of a co-installation solution³⁶⁷. It is noted that, from the outset, additional DSLAM will not be necessary, as PT states, since access (to PT's DSLAM) can be carried out at the level of Ethernet/IP.

If there are entities that consider it necessary to provide for this possibility of access, SONAECONOM itself recognizes that such an imposition would likely have limited effect given the existence of over ten thousand street cabinets, which, as commented, would imply a potentially high level of cost in overcoming the "horizontal barrier" (backhaul up to the street cabinet).

However, there are other relevant issues which call for careful consideration, such as the increase in regional interconnection points ("*as a way of encouraging greater commitment by operators to the construction of networks*"), including and especially at the level of the interface Ethernet, and more specific measures at the level of technical service/transmission parameters, such as definition of service classes with differentiated quality for different types of traffic, symmetrical speeds or 1:1 contention rate, with the possible definition of specific VLANs.

If it can be considered that an investment over the short term in ATM solutions may be economically inefficient, seen as a technology on the way to being replaced (in particular) by Ethernet technology (and with a low level of demand from beneficiary operators), then it can no longer be agreed that the same applies to investment in this latter technology. Indeed, Ethernet currently appears to be the most efficient technology for supporting current and future services on all-IP networks. This technology additionally supports PT's triple-play (meo) offer.

ICP-ANACOM therefore takes the position that a possible first step towards the adaptation and preparation of RAPT with respect to the evolution seen in networks and services over the short and medium term may be:

³⁶⁶ See draft recommendation: "*Virtual access remedies may evolve from current bitstream products to something which is more flexible and which better reflects the technical capabilities of the new networks. (...) When mandating wholesale broadband access, NRAs should mandate the provision of those wholesale products that best reflect the technological and commercial capabilities inherent in the new infrastructure so as to enable alternative operators to compete effectively*". Idem, Ibidem.

³⁶⁷ The European Commission itself, in the explanatory note on the Draft recommendation states that "[w]here FTTN is deployed, entrants may need to roll out their networks to street cabinets where the available number of end-users is significantly less than at the MDF, which creates a much more challenging business case for competitive access seekers at this network point".

1. Extension and flexibility of Ethernet aggregation with respect to the entire RAPT offer, i.e., an extension of coverage with Ethernet technology to all exchange areas, with particular relevance for those areas not currently covered by the LLU beneficiary operators and whose coverage in the future by NGA will probably see (most) delay³⁶⁸.
2. Addition of flexibility to the offer of local access and logical Ethernet connections, in particular in terms of establishing classes of service/VLAN and QoS mechanisms, or others.

ICP-ANACOM also takes the position that it may not be viable to make use of the other alternative (wholesale) offers in the market to make access available in general way to a range of services provided by different entities in competition, over the short and medium term.

At the same time, an expansion of regional access points may also contribute to the geographical expansion of the network of alternative operators throughout the national territory, whereby an investment of this type may be considered efficient, benefiting from the possibility of traffic aggregation in respect of a limited number of points, but relatively dispersed over the national territory. From the outset, this possible expansion must take into account the actual needs of beneficiary operators which are manifestly interested and suited to the current and future network structure and must be agreed in principle between the parties, PT and beneficiary operators of the RAPT.

With respect to possible support of new and/or advanced services, e.g. IP-TV, by the RAPT offer, account must be taken of various aspects, including technical, and economic and regulatory aspects. In this regard, it is noted that the European Commission states, in the explanatory note of the draft Recommendation³⁶⁹ that regulators should devote due attention to the proper market definition of Market 5, as in principle the deployment of NGA networks might lead to the emergence of retail services whose substitutability with existing retail services requires a more careful analysis (for example, very high-bandwidth Internet connectivity services, managed IPTV, high-definition audiovisual content or services requiring high-speed symmetric bandwidths, or a bundle of these services). According to the European Commission, these new services may generate a demand for new wholesale access services (broadband) with different characteristics from existing services (currently included in the relevant product market).

³⁶⁸ PTC, on its own initiative and in respect of the RAPT offer, made available a new "Aggregated Ethernet Access", although initially with coverage limited to a set of DSLAM/exchanges.

³⁶⁹ See page 17: "NRAs should devote due attention to the proper market definition of Market 5, as in principle the deployment of NGA networks might lead to the emergence of retail services whose substitutability with existing retail services requires a more careful analysis (for example, very high-bandwidth Internet connectivity services, managed IPTV, high-definition audiovisual content or services requiring high-speed symmetric bandwidths, or a bundle of these services). These retail services may in such a case generate a wholesale demand for broadband access services with different characteristics from the existing wholesale broadband access services currently included in the relevant product market. NRAs should therefore carry out a detailed substitutability analysis of the retail broadband services and the corresponding wholesale inputs in their review of this market".

The imposition of access is restricted to the supply of network capacity and technical conditions which enable the provision of IP-TV contracted by OSPs from the content providers. The management of IP-TV services is the responsibility of the offer beneficiaries.

It is noted that there should be no imposition of inappropriate or inadequate wholesale obligations when the regulator, supported by a clear and appropriate justification, determines that a given service, supported by NGA, constitutes an emerging retail market³⁷⁰.

Furthermore, there is recognition of the importance which the market already gives to the triple-play offers (including due to a factor of customer base loyalty) and that it is impossible for alternative fixed network operators to provide an IP-TV offer at national level (given the coverage restrictions at the level of LLU³⁷¹).

Finally, it may be necessary to provide for further adjustments to the wholesale offer of PT, in the event that it embarks on the widespread implementation of FTTH type solutions. As mentioned above, it is possible in this scenario that large swathes of territory will continue to exist where it will not be efficient and technically and/or economically viable for other operators to develop new network infrastructure, whereby the only alternative to the "monopoly" in the provision of NGA based services in these areas appears to be the possibility of operators having access to a wholesale offer which would enable them to develop retail services, preferably with a degree of differentiation and/or innovation. A possible adaptation of the RAPT in this scenario cannot be specified at this time, while uncertainty remains about technological evolution and the solutions which will be implemented on the ground, as well as the evolution of the services to be provided over this new infrastructure, even in the short and medium term.

3 Conclusions

The most general conclusion that can be drawn from the public consultation is that there are two radically different positions on NGA regulation.

While the incumbent argues for an almost complete break with the currently prevailing regulatory approach, the alternative operators seek to extend it, almost unchanged, to the development of NGA.

It is in this scenario that the Regulator is bound to act, submitting itself, in order to find a balanced solution in terms of the objectives of regulation, but open to future developments, to the establishment of clear terms of guidance.

It is important to recall that one of the basic concepts supporting current *ex-ante* regulation is access to essential, non-replicable assets.

³⁷⁰ See draft Recommendation.

³⁷¹ And, currently, only one alternative operator provides such services, supported by LLU.

Essentially, there is a presumption that ensuring *ex-ante* access contributes to providing conditions which ensure *ex-post* competition, whereas when this fails, it falls to the Competition Authorities to take action, and otherwise the sectoral authorities, but only in the vein of reviewing imposed *ex-ante* conditions (where this makes sense), notwithstanding collaboration in the evaluation of conditions *ex-post*.

The logic of access emerges because the historic development of the networks has led to the existence of natural infrastructure monopolies which, as a result of radical vertical integration, also formed natural monopolies in services.

Knowing the effects of monopolies and identifying the need to eliminate or at least mitigate their effects, regulation emerged with the first approach clearly focused on controlling the behaviour of the monopolist and not on trying to change the existing structure.

In contrast, the current regulatory approach is based on the idea of constructing, where possible, a competitive model in the vertical links of the chain, so that preferably the consumer has sustainable alternatives to choose from. The imposition of access, in its various existing forms, which is at the base of the well known "investment ladder", is formulated on the obligation of the designated incumbent operator to open up, on several levels and under different circumstances, the various links in the chain to the presence of other operators.

These links in the chain have, in the current regulatory settings, the designation of markets and the principle of imposing access based on the identification of SMP, in a clear indication of differential treatment between those that provide access and those that seek access, which ultimately justifies the designation of asymmetric regulation.

What is claimed as being the essential new aspect of NGA (which is at the core of the conflicting positions expressed above) is that the networks would be new networks, so that in principle and in contrast to situations with historic networks, there is no incumbent.

If this is the case, a flaw is introduced to the logic of imposing access, at least in terms of asymmetric access, whereby the hypothesis is raised of symmetric access even where limited to certain infrastructure, with emphasis on the conduits.

On the other hand, the impact of economies of scale may be significantly changed, putting into question the balance so far found in the current regulatory framework between the level of competition and the degree to which these economies of scale are harnessed. With this change in balance, it is also necessary to reassess the degree of disintegration in the productive process and access to the various links of the chain.

It is recognised, however, although with not insignificant changes, that due to the nature of NGA development costs, specifically the costs of civil engineering, the need to make use of the support infrastructure of the incumbent networks for the development of new networks contributes to reintroducing asymmetry to the process, in favour of the incumbent operators, which cannot be ignored.

In this context, the main regulatory concern has to remain the elimination of this asymmetry, taking into account the diversity of conditions prevailing in the availability and occupation of this support infrastructure of the networks.

The problem of developing new infrastructure to support these networks requires address, putting the question of whether or not it is regulated and, if so, whether the regulation should be symmetric or asymmetric and in respect to which components, always paying attention to concerns about competition and the encouragement of investment and innovation.

The response to these problems, based in large part on the input received in this public consultation, cannot stray from the guiding lights which define, at all times, the Regulator's options for intervention.

Accordingly, it should be noted, in particular that, currently:

- (a) Regulation continues to be based on analyses of the market in respect of which the European Commission has right of veto. In this case, and in principle, all proposed actions must have basis in the analyses of Markets 4 and 5.
- (b) The European Commission (and also the common position of the ERG) continues to affirm that there is no reason to change the basis for regulation, which means that all the remedies to be imposed must be based on market analyses and on the identification of SMP.

Without prejudice, it must be taken into account, also subsequent to the position taken by the ERG, that the European Commission considered, both in the proposed revision of the Framework Directive and in the draft Recommendation on NGA, the possibility of providing for measures of sharing on a symmetrical basis, although limited to conduits, poles and associated infrastructure. It is therefore also important in this area to remain open to future developments. However, in the present framework, the imposition of any obligations of this nature - *ex-ante* and symmetrical - is rejected, notwithstanding the recognition that the coordination of works may facilitate faster and geographically harmonious development of NGA, minimizing the need for investment in the construction of new infrastructure.

HORIZONTAL AND VERTICAL BARRIERS

Effective and non discriminatory access to conduits³⁷² and, in particular, the RCAO, may allow - especially if improvements were made to certain aspects, which will be the subject to specific analysis - a significant reduction of the costs involved in the deployment of NGA, whereas access to buildings (and their interior, e.g. "vertical conduits") are responsible for a significant portion of remaining costs.

³⁷² Including poles and associated infrastructure (hereinafter any reference to access to conduits shall include poles and associated infrastructure).

ICP-ANACOM recognises that the conditions of access to and use of passive infrastructure (conduits and other infrastructure such as poles) are and will be a key determinant in the development of networks in Portugal, including the network of the incumbent operator, so that the process of NGA roll-out and the development of services supported on NGA can take place in a competitive way. Access to this infrastructure allows a substantial cost saving with respect to the deployment of NGA, contributing to an improvement in social well-being.

In this respect, in addition to access to the conduits of the dominant operator- PT - it is also important to provide access for the installation of electronic communications to the passive infrastructure (i.e., conduits or poles) belonging to other entities - an issue which, at legislative level, is the responsibility of the Government, as reported, while ICP-ANACOM is charged with providing assistance.

To make the widespread roll-out of fibre optic to home solutions a reality in the shortest possible time, ICP-ANACOM will also seek, pursuant to its remit, to minimize or eliminate the "vertical barriers", i.e. any restrictions on access by an operator to the "vertical infrastructure" of buildings.

This Authority takes the position that, in this regard, conditions should be created to increase choice for the end-users and enable the entry of efficient operators into the market, including through the removal of vertical barriers which impede the provision of competing service in the same building, avoiding monopoly situations in NGA provision at the level of each building.

This objective may be pursued through the obligation to install a distribution frame or equivalent equipment in the building which facilitates the sharing of infrastructure within the buildings.

ACCESS TO CONDUITS - RCAO

In the context of the NGA, the promotion of non-discriminatory and transparent access to PT's conduits and associated infrastructure³⁷³ ensuring, in particular, the equivalence of access between the companies and departments of PT and the alternative operators, is an

³⁷³ The market power of Grupo PT in the provision of electronic communications services, in particular broadband access, stems in large part from its possession of this essential infrastructure (which is difficult to replicate efficiently due to the horizontal barriers involved, especially in terms of the costs and time involved in its construction, the impact on the citizens caused by frequent and extensive works in the soil and subsoil, and restrictions or procedural difficulties relating to the occupation of the soil and subsoil), whereby obligations aimed at containing said market power should be focused mainly at the level of infrastructure (and as "deeply" as possible). It should be noted that the capillarity of PT's conduit network, especially in terms of the access network, its specific and exclusive use for electronic communications networks and the availability of a reference offer since 2006, signifies that this infrastructure assumes a key role in the development of NGA, in view of the fact that there are no alternatives at this level with the same degree of functionality (in contrast to situations which may easily occur in terms of core networks).

important element of regulatory action. This obligation of equivalence of access - which also implies equivalence in access to information, in response times and times taken to provide services and the publication of levels of performance - is especially relevant during a phase in which both the regulated operator and the other operators will make more intense use of this infrastructure, where they decide to deploy fibre optic access.

However, regarding access to conduits, there may be situations in which:

- (a) there is no space available in a conduit; or
- (b) the multiple installation of fibre optics infrastructure is not economically viable, particularly due to socioeconomic reasons and/or the demographics of certain areas.

In these cases, alternatives must be found to avoid a regression to situations of monopoly, albeit localised, in the supply of NGA based services. These alternatives to access to conduits must be compatible with the principle of proportionality, that is to say, a minimum of obligations should be imposed in order to overcome the problems of competition identified and in order to contribute effectively to the evolution to a competitive situation.

LACK OF AVAILABLE SPACE IN CONDUITS

If there is no space available in PT's conduits, three options are put:

- (a) operators access conduits belonging to other entities along the desired route, which, if available, may provide the solution sought by operators;
- (b) operators carry out the construction of new conduits, which, in the event that this is permitted by local authorities³⁷⁴, is a costly solution - especially if the investment is not shared among several operators, including PT -, which is also lengthy and which causes major disruptions in terms of the territorial planning, to the lives of people and to economic activity;
- (c) alternative solutions are made available by PT (where it possesses fibre in the conduits in question).

It is considered that the solution preferred by the operators will be solution (a) and that they will only resort to alternative solutions if the first is not available.

Accordingly, the closest "substitute" to conduit access is access to dark fibre, the rental of unlit fibre (dark fibre) with a route which is equivalent to that guaranteed through access to the conduits. In this case, instead of renting conduit capacity and installing their own fibre optic cable, the operator leases the physical fibre optic infrastructure³⁷⁵.

³⁷⁴ Physical limitations may also exist with respect to the feasibility of replicating these conduits, whereby this solution is subject, in certain situations, to restrictions on the occupation of subsoil arising from overcrowding or from regulatory restrictions imposed by local authorities or other entities with jurisdiction over the area concerned.

³⁷⁵ The price of which includes, of course, a component connected to the fibre itself and another components connected to the conduits through which the fibre passes.

As such, if there is no space in the conduit for other operators, but PT owns the fibre in the conduit in question, the possibility that operators can have access to dark fibre, whether in the core network, for instance with backhaul solutions in an FTTCab scenario, or in the access network, is proportional - having installed optical fibre available -, since there may be no cheaper alternative for the market³⁷⁶. Indeed, provision is already made for this possibility according to the obligations of Market 4³⁷⁷.

The rental of dark fibre could result in the unbundled access to fibre optic, in the event that access is given to dark fibre between the end-user's premises and any point of the network. This unbundled access to fibre optics can, in particular, take the form of physical access (point-to-point solutions, at the level of the optical distribution frame - ODF) or access to the wavelength (point-to-multipoint - PON solutions).

Finally, if in addition to the unavailability of access to conduits situations arise where there aren't the technical conditions, as duly demonstrated (for reasons of capacity or other), which allow the rental of dark fibre or unbundled access to fibre optic, virtual access should be guaranteed³⁷⁸ to the network installed in the meantime, thereby ensuring that end-users have a choice when it comes to their provider of NGA based services. This possibility³⁷⁹ is justified and is proportionate in cases where there are no other alternatives, including the above. In the case of competitive areas, virtual access to the network constitutes an alternative option (to access to fibre), provided that there is agreement between the parties involved.

In any case, it should be stressed that ICP-ANACOM encourages the sharing of infrastructure, particularly in terms of civil construction, by the various market participants, since this allows networks to be developed more efficiently and quickly, with resulting positive consequences at consumer level.

³⁷⁶ The alternative would be the construction of new conduit which as mentioned, is costly. Another alternative might be for access to the conduits of other entities, where these exist along the route in question.

³⁷⁷ On page 112 it is stated that " As mentioned above, ICP-ANACOM is currently examining the issues related to the evolution to NGN and will consider in this context, the possibility of imposing, in addition to the obligation of access to conduits (pursuant to Law 5/2007 and which remains fundamental for the development of competition in this market), access to dark fibre, particularly in situations where access to conduits is not possible for reasons of capacity or other reasons, and the possibility of unbundling the fibre optic loops." (Emphasis added by the author).

³⁷⁸ This is an advanced bitstream type solution.

³⁷⁹ There is provision for the imposition of a bitstream offer in Market 5.

LACK OF ECONOMIC VIABILITY OF ACCESS TO CONDUITS

Despite access to conduits being available throughout the national territory (with the alternatives identified above in the absence of space), it is expected that in certain areas, of less appeal, one of two types of situations may occur³⁸⁰:

- (a) A single NGA is deployed;
- (b) Private initiative, on its own, does not have the necessary incentive to invest in NGA.

In both cases it is necessary to arrive at measures which promote competition, avoiding the creation of monopolies at retail level and prevent the info-exclusion of these areas. From the outset, given the lack of economic viability in the replication of the fibre optic access network, access to pipelines belonging both to electronic communications operators and to other entities owning this infrastructure will not in itself be sufficient to ensure competition and choice for end-users.

Under these terms, the promotion of competition in the provision of NGA services in non-competitive areas must be ensured through complementary access to other solutions, such as access to the actual optic fibre or dark fibre and virtual access to the network, when provision of NGA services commences. It is noted that this approach is consistent³⁸¹ with the analysis of the broadband accesses markets³⁸².

THE TRANSITION OF BUSINESS MODELS BASED ON LLO TO NGA

In parallel with the approach above, transparency and regulatory certainty should be ensured, as well as continuity of the LLU based models (for as long as there is dominance in the access market) over the short term. Otherwise, the operators could see their previous expectations disappointed and the evolution to NGA and actual competition in the market may be undermined.

Indeed, several operators have made significant investments in co-installation and loop unbundling, whereby it is necessary to consider appropriate periods and models for transition, so that such investments are not put at risk and also so that the levels of competition which have already been achieved are not jeopardised, while account must also be taken of the risk that this transition may result in a (re)monopolisation in the electronic communications markets. In this sense, there is a need to define mechanisms which provide for non-disruptive migration to NGA.

³⁸⁰ The definition of these areas may justify further evaluation as part of the analysis of market 5, whereas at present they are identified only as areas which are not competitive and which could ultimately prove too large given the different development stages of the copper and fibre optic networks.

³⁸¹ It is, indeed, expected.

³⁸² In which it was set out that in the context of NGA evolution, an assessment would be made in a separate document of "*the possibility of imposing, under specific conditions, a wholesale offer of optic loop access*".

Necessary measures in this context are therefore related to the publication, in a timely manner, of appropriate information on the evolution to NGA as well as ensuring the maintenance of LLU access for a reasonable period, which measures may be set out in a future determination, in the event that no agreement is reached in this respect between PTC and the beneficiaries of the offer within a short period of time.

An issue that could arise if PT develops FTTCab solutions, during an initial phase or in determined areas, is the possibility that access to the local sub-loop (and co-installation in street cabinets) might take on a certain importance. However, it should be noted that even if Grupo PT invests in a solution of this type, other operators may develop a separate solution, e.g., FTTH/B, through access to conduits (especially in competitive areas). In these cases, operators must at least be provided with information, with reasonable advance notice, on PT's plans on the relocation of loops, so that they are able to prepare the migration of their customers to other solutions. In non-competitive areas it is not likely that access to the local sub-loops will be a viable solution, as neither was access to the local loop. In these cases the most appropriate and priority solution appears to be virtual access to the network.

In this case, and in the event of capacity restrictions in the conduits, it should be possible to use PTC's surplus fibre optic, or alternatively, the transmission capacity offer. That is, in the event that PT implements FTTCab type solutions and operators decide to (co)install (in or) at the street cabinets, a specific offer should be made available by PT for backhaul, possibly an extension of the "signal transport service" (in practice, a dark fibre connection backhaul short-distance) provided by PTC under the RUO.

Accordingly, and according to the principle of proportionality in the imposition of obligations, consideration is given to a "phased" approach, possibly based on the analyses of markets 4 and 5, in which, besides obligations of non-discrimination and transparency related to the transition of LLU based models to NGA:

- In competitive areas, only access to conduits is imposed, with improvements and equivalence of access, whereas other obligations are imposed (access to the actual fibre or dark fibre) only where there is a lack of space in conduits. In the last resort, where there is agreement between the parties, and as an alternative to access to own fibre or dark fibre, the option of virtual access to the network may be taken;
- In non-competitive areas, in addition to access to conduits, access to own fibre or dark fibre is also imposed, as well as virtual access to the network (advanced "bitstream").

Glossary

3D: Graphics applications with three dimensions.

AP (“*Attendance Point*”): The technical name for a node/point of the network belonging to a given Exchange Area (EA), which covers a determined geographical area within the EA with capacity to support FTS and ADSL services.

Backhaul: Generally, a connection between a point (node) belonging to the access network and another point (node) of the core network or transport network.

CDMA/UMTS (“Code Division Multiple Access”): A method to access channels in communication systems. A technique used for the digital transmission of cellular telephone signals, enabling more efficient use of the spectrum. Also called "*spread spectrum*", it has several versions, e.g. to CDMA2000, the most used, and the W-CDMA standard of the third generation (3G)/UMTS.

CMTS (“*Cable Modem Termination System*”): Equipment which functions as a translator of protocols and allows the transport of Internet data by the coaxial cable network. With the CMTS, the Internet’s digital signal is converted into analogue and sent to the cable modem installed at the subscriber's computer, which converts it back to digital. The market's main suppliers of CMTS work with the DOCSIS open standard ("Data Over Cable Service Interface Specifications")

Contention rate: With respect to broadband access, this corresponds to the ratio between in practice the access speed actually provided to the end-customer and contracted speed (theoretical maximum speed).

CPE (“*Customer Premises Equipment*”): Communications equipment (modem, telephone, set-top-box, etc..) Installed on the premises of the end-customer.

DP (“*Distribution Point*”): The point of separation between the secondary distribution network and the intermediate network or the network of cables in buildings, where there is no intermediate network.

DSLAM (“*Digital Subscriber Line Access Multiplexer*”): Equipment which enables broadband Internet access to be supported over copper lines. Network equipment, usually located in the local exchange (but which may also be installed in a street cabinet), whose function is to

concentrate traffic from different phone lines with an xDSL compatible modem and route it over the data network (*core*).

DSL or xDSL (*"Digital Subscriber Line"*): a family of technologies which provide a means of digital data transmission over copper pairs, using the telephone network that reaches most homes. The typical speeds of "*download*" of a DSL line ranges from 128 kilobits per second (kbps) to about 100 Mbits/s depending on the technology which is deployed and offered to the customers as well as the length of the copper loop. The "*upload*" speeds are less than those of "*download*" for VDSL and ADSL (asymmetric transmission technologies) and are equal in the case of SDSL or other symmetric technologies.

DTH (*"Direct-To-Home"*): Subscription television and audio signals distribution service by satellite. Uses the satellite network for the direct distribution of television and audio signals to subscribers within the area of provision.

DTT (*"Digital Terrestrial Television"*): the name of the set of standards for digital television designed to replace analogue television systems. This system provides a capacity which far exceeds the analogue system, supporting a greater number of channels and other types of additional services. It includes, among others, specifications for a terrestrial component (DVB-T), cable (DVB-C) and satellite (DVB-S).

ERG (*"European Regulators Group"*): Independent Group comprising the 27 national regulatory authorities of the 27 Member States, established by the EC in 2002 to provide reflection, discussion and advice in the area of electronic communications regulation.

Ethernet: The Ethernet is a local network technology ("*Local Area Networks*"- LAN) based on the transmission of packets and based on standard IEEE 802.3. Such LAN networks typically operate in the same building and connect nearby devices. Recent advances in technology have managed to increase these distances and current Ethernet networks can cover tens of kilometres.

FTS (*"Fixed Telephone Service"* - traditional telephone service on the fixed network): Offer to the general public, of direct voice transport in real time and at fixed locations, allowing any user using equipment connected to a network termination point to communicate with another terminal point.

FTTx: Technologies using fibre optic for the provision of data communication services, TV, Internet access and telephony. The fibre optic is extended up to the street cabinet, pavement, or even as far as the home, replacing the copper cables or coaxial cables.

Includes FTTN technologies ("*Fibre To The Node*"): Optic fibre up to the node; FTTC ("*Fibre To The Curb*"): Optic fibre up to the pavement; FTTB ("*Fibre To The Building*"): Optic fibre up to the building; FTTH ("*Fibre To The Home*") Fibre optic up to the home; FTTCab ("*Fibre To The Cabinet*") Fibre optic up to the street cabinet.

FWA (BWA) ("*Fixed / Broadband Wireless Access*"): A descriptive term for new wireless broadband technologies, which include fixed, nomadic and mobile type applications.

H.323: The H.323 standard (ITU-T Recommendation - "*International Telecommunication Union Telecommunication Standardization sector*") aims to specify multimedia communication systems based on packet networks without guarantee of Quality of Service (QoS).

HDTV: ("*High Definition Television*").

HSPA ("*High Speed Packet Access*"): A set of protocols for 3G/UMTS networks, which allow greater speed of access (e.g., 7.2 Mbps in *download*).

ITED: ITED is the regime governing the design and installation of telecommunications infrastructure in buildings and its connection to the public telecommunications networks. It also governs the activity of installation certification. It is regulated by Decree-Law No 59/2000 of 19 April and is based technically on the ITED Manual (which covers the technical solutions considered as being minimum, based primarily on copper-pair and coaxial cable technologies. Reference is also made to fibre optics technology, which will be addressed in more detail in future editions), and on the associated procedures³⁸³. Since 1 January 2005 it has been mandatory for all telecommunications projects in buildings to be completed in accordance with the ITED regime.

IP ("*Internet Protocol*"): A protocol for communication between nodes (and equipment) of the network for routing data. Data on an IP network are switched and sent in packets (or datagrams).

IP-TV: Distribution of TV channels (including high definition channels, HD) over IP networks.

LE ("*Local exchange*" or "*Remote Unit*"): Building (or, in the case of exterior remote units, a street cabinet or container) where the (copper and fibre optic) cables of the access network terminate, connected to distribution frames, and the location of switching and core network transmission equipment.

³⁸³ See <http://www.anacom.pt/template2.jsp?categoryId=1402>.

LLU (Local Loop Unbundling Offer): LLU is the provision by PT Comunicações to other operators of the local loop in twisted copper pair, so that these operators can reach the user with their narrowband and/or broadband services.

Local loop: The local loop is the physical circuit connecting the terminal equipment on the premises of the end-user to the infrastructure of the operator's network, usually to the MDF.

LTE (*"Long Term Evolution"*): possible future evolution of 3G/UMTS networks, which may enable mobile access at speeds equal to or greater than 100 Mbps.

MDF (*"Main distribution frame"*): Infrastructure typically located in local exchanges (and remote units), used to terminate copper pair cables from the distribution network with (inter)connection to switching/aggregation equipment (e.g. network switch or DSLAM).

MPLS (*"Multi Protocol Label Switching"*): A technology used for routing packets based on labels (added to the IP packets at the "entry" of the "backbone"), with the routing based on this label and not the IP address. It ensures QoS (quality of service) with priority given to critical applications. MPLS also allows Virtual Private Networks (VPN) to be established, guaranteeing complete traffic separation with the creation of the routing tables unique to each VPN.

Naked DSL: *"Naked DSL"* is a type of wholesale offer whose purpose is to enable the provision of an ADSL service to the end-user without the operator owner of the local loop requiring that the end-user contracts or maintains the STF.

NGN: Recommendation "Y.2001 (12/2004) - *General overview of NGN*", of the ITU-T, defines NGN As : *"A packet-based network able to provide Telecommunication Services to users and able to make use of multiple broadband, QoS enabled transport technologies and in which service-related functions are independent of underlying transport-related technologies. It enables unfettered access for users to networks and to competing service providers and services of their choice. It supports generalised mobility which will allow consistent and ubiquitous provision of services to users"*.

NTP (*"Network termination point"*): Terminal point (end) of the individual installation of the end-user, which provides for the connection of any telecommunications equipment, using a physical pair.

ODF (*"Optical Distribution Frame"*): Passive equipment where the fibre optic cables terminate, equivalent to the copper distribution frame (MDF).

OLT (“*Optical Line Terminal Unit*”): Equipment normally located in the local exchange, which is the point of connection of the access network (fibre) to the *core* of the network. It also allows the concentration of traffic and the separation of voice and data, where necessary, for switching networks of circuits (TDM) and to the data network (e.g. ATM).

PON (“*Passive Optical Network*”): Passive optical network, i.e. without the use of active equipment. An optical point-to-multipoint network in which the fibres of individual users are aggregated in a passive optical *splitter* with a single optical fibre shared between the aggregation point and the OLT. There are no active components between the operator's equipment (OLT) and the CPE installed on the premises of the end-user.

QoS (“*Quality of Service*”): Name used for a set of parameters that characterize the performance, for example, of a circuit, a network or a service.

RCAO (“*Reference Conduit Access Offer*”): Reference Offer published by PT Comunicações, which establishes the terms and conditions to be observed by operators of public telecommunications networks with respect to access to this company's conduits.

RU (“*Remote Switching Unit*”): Equipment normally connected to the local exchange via fibre, which enables connections between the local loops and a remote network node (closest to the customers) with concentration functions.

RUO (“*Reference Unbundling Offer*”): Reference offer published by PT Comunicações, which establishes the terms and conditions to be observed by operators of public telecommunications networks in respect of local loop unbundling.

SIP (“*Session Initiation Protocol*”): A standard of the Internet Engineering Task Force (IETF) (RFC 3261, 2002), used to establish calls and conferences over networks via IP. The configuration of the session, change or termination is independent of the type of network or application that is used for the call; a call can use different data types, including audio, video and other formats.

TDM (“*Time Division Multiplexing*”): Switching and transport technology used in the current switching networks of circuits.

VoD (“*Video on Demand*”): Video service provided on demand, which enables the transmission of a programme (featuring in a catalogue) to a customer at a desired time and in response to an individual request, usually in return for payment, in contrast to conventional television broadcasting which is transmitted to all customers capable of reception.

VoIP (*“Voice over Internet Protocol”*): A technology which allows the user to establish telephone calls over a data network such as the Internet, converting an analogue voice signal into a set of digital signals in the form of packets with IP address, which can be sent, for example, through an Internet connection (preferably broadband).

WiMAX (*“Worldwide Interoperability for Microwave Access”*): A wireless technology which allows broadband Internet access, with a radius of coverage exceeding that of Wi-Fi, with some experts considering the technology a potential replacement for DSL