Commission for
Communications Regulation

Position Statement

Regulatory Aspects of Next Generation Networks

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An Coimisiún um Rialáil Cumarsáide
Commission for Communications Regulation
Abbey Court Irish Life Centre Lower Abbey Street Dublin 1 Ireland
Telephone +353 1 804 9600 *Fax* +353 1 804 9680 *Email* info@comreg.ie *Web* www.comreg.ie

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Executive Summary

Around the world the move to NGN has accelerated apace in recent years with increasing numbers of operators across fixed, wireless and cable platforms all announcing planned NGN deployments. With the potential to reduce costs and deliver a range of new and innovative services, NGN offers the industry a unique opportunity to improve efficiency and create additional value in the converging electronic communication and digital media markets. ComReg believes the decision to invest in NGNs is a positive one and while widespread deployment will take place over a number of years it will bring benefits for both consumers and industry alike. Accordingly ComReg has and will continue to commit considerable time and resources to identifying and addressing any regulatory challenges that may arise that might constrain their timely deployment. As part of this process ComReg had identified a number of key areas where it believes guidance and clarity would be beneficial both in terms of ensuring ongoing investment and the promotion and sustaining of competition. These include:

- Regulatory Predictability
- Current Products
- Regulated Products

Regulatory Predictability

Key among the challenges in facilitating NGN is to ensure that there is no potential for any perceived regulatory uncertainties. Such uncertainties, which may relate to the continuity of existing regulatory obligations or the nature of any future ones, can affect long-term commercial planning and unduly influence investment decisions. ComReg has sought to address this by outlining in this paper its intended approach to regulation in an NGN environment. In doing so ComReg believes it will foster a more predictable regulatory environment that will enable operators to make better and more informed decisions when considering how best to compete in the market.

Current Products

One area where ComReg was keen to ensure that any perceived uncertainties associated with the roll-out of NGNs did not undermine investment was in relation to the existing competition build up on the current suite of wholesale regulated products. A significant base of the market is now dependent on these products and ComReg would not wish to see this undermined by any perceived uncertainty over their continuing regulatory support. Accordingly this paper outlines ComReg's intention to retain existing obligations to provide the current suite of regulated wholesale products (where significant market power continues to be found) for the duration of the upcoming series of Market Reviews. In doing so ComReg is particularly keen to ensure that recent progress on Local Loop Unbundling (LLU) is not undermined. As such ComReg would insist that any proposed withdrawal of network infrastructure that is essential to the fulfilment of those obligations – in particular the location of exchanges and the continued presence of local copper loops would be preceded by an adequate notification period of approximately three to five years. This removes most risk from the perspective of other fixed operators, although

it is important to note that eircom has indicated that it does not propose to remove either exchanges or copper and have described their plan as an "overlay" network.

Future Products

Whilst ComReg is keen to provide certainty during the transition period to NGNs, at the same time it would encourage operators to use this time to plan for their own migration. Market developments both here and abroad suggest that the industry is steadily progressing towards NGN with eircom's recent announcement of plans to begin deploying fibre in its access network further evidence of this trend. ComReg believes that it is now timely for industry to begin considering what future wholesale product sets might be appropriate in an Irish context and what regulatory changes may be needed to give effect to them. ComReg will also insist that any future NGN wholesale products must include effective migration processes from current wholesale products. In this paper ComReg highlights a number of important issues associated with potential future regulated wholesale products - such as sub-loop unbundling and next generation bitstream and leased line services - that it intends to consider in its upcoming series of Market Reviews.

Next Steps

NGN deployment represents a major development in a country's infrastructure that will affect network operators, businesses and consumers. ComReg is continuing to examine the implications of their introduction and the precise regulatory settings that this may warrant through a series of pricing and market reviews. It is hoped that this work will provide greater clarity on various regulatory aspects of NGNs and ensure that the introduction of NGNs as key part of Ireland's 21st Century communications infrastructure is achieved in a smooth and timely way and supports the continuation of a diverse and competitive sector for the benefit of all Irish consumers.

1 Introduction

The recent announcement of NGN deployment plans by a number of operators in Europe has helped to focus attention on the implications such plans can have for the electronic communications industries and their regulators. In Ireland, eircom has announced plans to migrate to a Next Generation IP core network and to deploy fibre in its access network in selected urban areas[1]. Given the importance of economies of scale in sustaining competition and eircom's Significant Market Power (SMP) in certain markets[2], these developments present a number of challenges for the ongoing promotion of competition.

In particular eircom's proposals to deploy fibre deeper in its access network raise questions as to at what is the appropriate level(s) in the network to facilitate the continued development of infrastructure-based competition. Related to this issue is the question of the relative efficiency of running two parallel networks for an extended period of time and the impact this may have on cost competitiveness within the industry generally. Finally, there are wider policy concerns about the implications of a 'hybrid network' of current and next generation technologies[3], where the initial availability of any new services may be confined to certain 'economically viable' areas where most of the existing competition is already located.

These and other issues relating to NGN deployment are now only emerging and their impact on the market has yet to be fully understood. There will be both initial and longer term challenges that will need to be addressed, but with these come opportunities to improve and strengthen competition to the benefit of consumers. As part of this process in this initial paper ComReg aims to increase regulatory certainty around some of the competition aspects of NGNs by outlining its intended policy in relation to wholesale product sets. ComReg hopes that this guidance can assist the industry to better plan its transition to NGN, so that all stakeholders – operators, businesses and consumers – can enjoy the many benefits of increased choice, efficiency and innovation that NGNs can bring.

1.1 Scope and Objectives

In September 2006, ComReg announced the initiation of an ongoing Work Programme aimed at facilitating a better understanding of the implications of NGN deployments[4]. Key objectives of this work programme included:

- To frame the industry discourse on NGNs;

[1] See eircom Press Release (15.11.06) and NGN presentation (09.03.07)

[2] It should be noted that eircom is not the only operator with SMP obligations. Several fixed and mobile operators have SMP in the relevant call termination markets. See Section 5.4 for more details.

[3] Such a 'hybrid network' may comprise of exchange-based technologies (e.g LLU, leased lines, etc…), fibre to the cabinet technologies (e.g. VDSL) and in time potentially fibre to the building technologies (e.g. GPON).

[4] See ComReg 06/49

- To provide a common understanding of the key regulatory issues;
- To establish the foundation for their detailed implementation.

Building on this work programme, this paper seeks to provide the industry with guidance as to ComReg's intended approach to the regulation of future wholesale product sets in an NGN environment[5]. Notwithstanding the fact that NGN developments are taking place across all platforms, the focus in this paper is primarily on developments in wireline networks, in particular the existing copper-based local loop, as this is where most of the current regulatory obligations are directed. This is a complex task because under the EU regulatory framework precise regulatory settings cannot be determined without first conducting Market Reviews. Nevertheless, as regulation is technology neutral and based on fundamental economic and competition principles, it is possible to provide a broad indication of what these future regulatory settings may encompass. This paper seeks to achieve this without prejudice to the conduct or findings of ComReg's future market analyses.

In summary, the key objectives of this paper are:

(i) To set out and provide guidance on ComReg's policy position in relation to the existing suite of regulated wholesale products; and

(ii) To provide an outline of the main issues associated with the future wholesale product sets that will be considered in upcoming Market Reviews.

1.2 Structure of this Paper

The remainder of this paper is divided into five sections:

- **Section 2** seeks to provide a working definition of the term Next Generation Network;
- **Section 3** describes some of the key principles that guide ComReg's overall policy and direction, and how ComReg expects to apply them in an NGN environment;
- **Section 4** outlines how ComReg expects the introduction of NGNs will affecting existing regulated wholesale products;
- **Section 5** identifies some of the potential competition remedies that could possibly be warranted and introduced in a future NGN environment; and
- **Section 6** lists a range of NGN-related projects that ComReg is currently focused on to facilitate a smooth and speedy transition to NGNs.

[5] The deployment of NGNs is likely to also raise a range of other regulatory issues such as those relating to the interconnection and interoperability and end-to-end quality of service and consumer protection issues. ComReg intends to work with industry and identify and address these issues in due course.

2 What is a Next Generation Network?

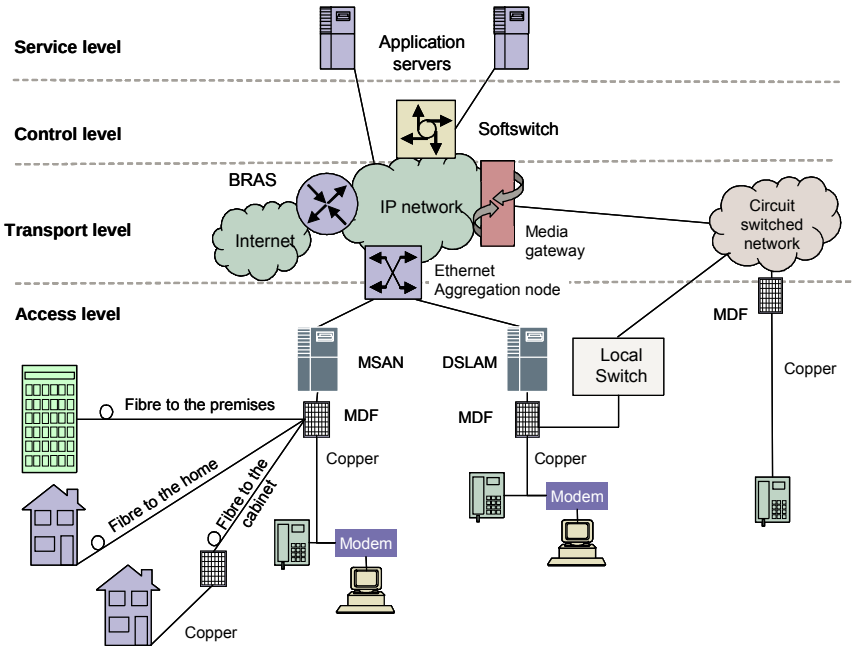
'Next Generation Networks' is a generic term for various new technologies that are being integrated into, and progressively replacing, existing telecommunications networks. It refers more to a concept of a single converged IP-based network than to any particular type of technology or infrastructure.

There is no singularly authoritative definition of an NGN, although a number of working definitions have been developed by technical standards-making bodies[6]. However, a number of characteristics distinguish NGNs from legacy telecom networks that exist today. Most significantly, NGNs:

- are IP-centric rather circuit-switched;
- separate the service-related functions from the underlying transport technologies; and
- can utilise many different broadband, QoS-enabled, transport technologies.

NGNs are capable of providing multiple high-bandwidth services, including multi-media services, and may facilitate the rapid development of new services over a single multi-service network. Conceptually, the architecture of NGNs is often characterised by the separation of the four main network functions - that is, the access, transport, control, and service layers - as shown in Figure 1.1.

Fig 1.1: Typical NGN Architecture with PSTN interworking (Ovum)



[6] ITU-T Recommendation Y.2001 (12/2004) General overview of NGN defines an 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'.

2.1 Next Generation Core and Access Networks

ComReg's use of the term 'NGN' encompasses two related, but distinct, aspects of the transition to an NGN environment, namely the migration of operators' core networks to an all-IP environment (sometimes referred to as 'Next Generation core networks'), and the introduction of high-speed high-bandwidth access networks (often called next generation access networks or 'NGA networks').

2.1.1 Next Generation Core Networks

Migration to a Next Generation Core network typically involves the collapsing and integration of the core network elements of legacy public switched telephone networks (PSTN) and public switched data networks into a single, multi-purpose, IP-based core network. This consolidation of several service-specific network overlays into one multi-service network means fewer network elements, better economies of scale and scope, simpler service management and faster provisioning of new services.

2.1.2 Next Generation Access Networks

Migration to a Next Generation Access (NGA) network refers to current and future developments in the local loop and implies significant investment in high-bandwidth infrastructure, principally in that segment of the network running from multi-functional access/aggregation nodes to end-users. An NGA network can be composed of fibre (with or without *x*DSL-enabled copper[7]), coaxial cable, wireless technologies, or hybrid deployments of these technologies.

2.2 Next Generation Operation Support Systems

In addition to Next Generation Core and Access networks, many operators are also installing Next Generation Operational Support Systems. Operational support systems are the IT systems used by operators to support standard business processes (e.g. ordering, provisioning, fault management, etc…). Today, most of the existing OSSs that operators use to support current generation services are stand-alone platforms designed to support a single function or activity. As operators move to deploy NGN infrastructure, they are also looking to overhaul and replace the existing multitude of systems with a more integrated Next-Generation OSS. It is expected these Next-Generation OSS will provide for end-to-end management of wholesale business processes using standardised interfaces[8] to support efficient processing of transactions.

[7] NGA deployments involving fibre typically comprise of either: (i) fibre to the cabinet and then xDSL technologies over copper from the cabinet to the end-users' premises (FTTCab): or alternatively (ii) fibre all the way to the building (FTTB). Depending on their strategic outlook, operators may choose to deploy these network topologies sequentially (i.e. FTTCab initially, before migrating to FTTB in time) or in parallel (FTTCab in some areas and FTTB in other areas).

[8] such as XML-based interfaces.

3 General Principles

Underpinning ComReg's approach to NGNs is a number of core regulatory principles which guide its overall policy and direction. ComReg intends that these principles will continue to be relevant as the industry enters an NGN environment. In this section, ComReg outlines how it foresees the application of these principles and how, if applied, they are likely to influence ComReg's approach when dealing with wholesale products in an NGN environment.

3.1 Technology Neutrality

In accordance with Section 12(6) of the *Communications Regulation Act, 2002*, ComReg must strive to keep its regulation of electronic communications networks and services technology neutral. If significant market power ('SMP') is found to exist in any defined market, ComReg must impose appropriate regulatory measures to foster competition in that market, regardless of the technological platforms deployed.

If services delivered over NGNs are found to belong to a defined market that is not effectively competitive, then under the current Framework Regulations ComReg must impose appropriate obligations on those undertakings with SMP in that market. The key determinant to the introduction or maintenance of any such obligations is thus the market definition and existence of SMP, and not the nature of the technology employed.

This is consistent with the view of the European Commission:

> *Use of more efficient technology to provide existing regulated services does not alter the justification for that regulation. The move to NGNs does not provide an opportunity to roll back existing regulation on services if the competitive conditions have not changed.*[9]

3.2 Non-Discrimination

Under Regulation 9 of the European Communities (Electronic Communications Networks and Services) (Access) Regulations 2003, ComReg may impose on an operator that has SMP in a relevant market any of the obligations set out in Regulation 10-14 therein, as ComReg considers appropriate. Regulation 11 requires that where ComReg imposes interconnection and/or access obligations, ComReg must ensure that the operator affected:

[9] European Commission Staff Working Document: Public consultation on a draft Commission Recommendation On Relevant Product and Service Markets within the electronic communications sector susceptible to ex ante regulation [SEC(2006)837], June 2006, p16.

(a) applies equivalent conditions in equivalent circumstances to other undertakings providing equivalent services, and

(b) provides services and information to others under the same conditions and of the same quality as the operator provides for its own services or those of its subsidiaries or partners.

ComReg believes that this core principle of non-discrimination will apply equally in an NGN environment.

3.3 Promoting infrastructure competition at deepest level viable

In accordance with Section 12 of the *Communications Regulation Act, 2002*, ComReg must exercise its functions in a way that promotes competition and efficient investment so that consumers benefit in terms of price, choice, and quality. In economic terms, such improvements in consumer welfare derive from the gains in both dynamic and static efficiency that occur through competition.

Dynamic efficiency gains derive from innovation in technologies and services which reduce production costs and are assigned greater value by consumers. In contrast, static efficiency gains derive from the most efficient use of existing technologies. Static efficiency is maximised through intense competition leading to lower prices.

While the deployment of NGNs should lead to dynamic efficiency gains, the maximum possible benefits will only be passed onto consumers if the trend of increasing infrastructural based competition continues. Infrastructural competition is generally associated with greater dynamic efficiency as there is more scope for innovation in products and processes when there are competing infrastructures. Further, the competitive pressure to minimise costs is exerted over the entire value chain, potentially leading to greater value for consumers. For these reasons, ComReg has always sought to promote infrastructural competition generally and in regulated markets at the deepest practicable level in the network (i.e. as close as practical to the customer).Whilst over time, the particular level in the network at which infrastructure competition is practicable may shift in response to changes in what is technically feasible and the associated economies of scale, the objective of greater infrastructure competition will not change and remains just as relevant and important in an NGN environment as it does now. This objective will remain a central tenet of ComReg policy and will continue to be supported by a wholesale pricing policy that encourages and incentivises infrastructure roll-out.

In those areas where NGN infrastructure competition is not feasible, ComReg will continue to encourage service-based competition in the interests of static efficiency. In the absence of competing infrastructures, increased consumer welfare depends upon vigorous competition in services. As service competition tends to be a ‘stepping stone’ to long term infrastructure competition, ComReg will ensure that suitable and seamless migration processes are established to facilitate the movement of other authorised operators (OAOs) and their customers from all existing regulated access products to their equivalent and/or successor products in an NGN environment (and between different NGN products).

3.4 Facilitating efficient investment

Section 12 of the *Communications Act, 2002* requires ComReg to promote competition by encouraging efficient investment in infrastructure and promoting innovation. Some commentators have argued that this objective can best be achieved by adopting a 'regulatory forbearance' approach to NGN investment. This would involve exempting investments in NGN infrastructure from access regulation for a set period of time, such as the period covered by a Market Review, even if the infrastructure constituted an economic bottleneck. The aim of such a policy would be to provide incentives to prospective investors in network infrastructure by allowing them to operate in an unregulated market for a limited period, thereby increasing their confidence of securing a positive and timely return on their investments.

However, there are many disadvantages of 'regulatory forbearance'. Such a policy could actually increase, rather than reduce, uncertainty for investors - particularly where such investments are in the access network. NGA investments can have very long pay-back periods while periods of regulatory forbearance are more likely to be more short-term. Uncertainty about the impact of regulation on revenue streams in the years following a forbearance period may affect a business case more than any uncertainty about demand in the early years. Further, if the next generation of services supplied over NGNs are intended to replace the existing regulated services, then a policy of forbearance could simply ingrain existing dominance in the market. The competitive benefits gained from first mover advantage and the economies of scale involved could mean that it would take many years after the period of forbearance before competitors could return to the position they hold in the market today[10].

Hence ComReg does not consider regulatory forbearance to be a practical option, particularly as ComReg's legal obligation is to encourage *efficient* investment as opposed to incentivising any investment. There is no guarantee that regulatory forbearance would encourage dominant operators to be efficient in their investment - indeed in the absence of competitive pressures the opposite may well occur.

3.4.1 Ensuring incentives for efficient investment are not distorted

Whilst unconvinced of the supposed merits of regulatory forbearance, ComReg does recognise that potential investors are likely to require some degree of confidence that they will be able to earn an appropriate return. In this respect, it may be appropriate to distinguish between investments in next generation core networks ('NGN core') and next generation access networks (NGA). In relation to the former, there is growing evidence to suggest that the deployment decision is driven primarily by the scope for potential cost savings with the emphasis on continuity of existing services[11]. The investment risk in this instance is mainly associated with

[10] A regulatory forbearance policy may also be in contravention of EU regulations. In February 2007 the European Commission launched infringement proceedings against Germany for the granting of regulatory forbearance or a 'regulatory holiday' to Deutsche Telekom in respect of its VDSL services.

[11] CSFB have estimated average opex savings on core NGN deployments of approximately 30%. Source: CSFB, 'IP: The Holy Grail for Operators', 10th March 2005.

implementation and vendor management and as such is difficult to distinguish from the business risk facing telecom firms generally. In contrast it can be argued that the investment decision for NGA deployment is driven by the revenue opportunities from offering new and innovative services such as IP-TV. In this instance there is a disruptive change to existing services and business models. Here the investment risk differs from that affecting the business generally given the relative uncertainty as to consumers' willingness to pay for these new and untested services.

ComReg believes that these differences are material such that not to make this distinction risks distorting incentives and encouraging inefficient levels of investment. Accordingly, ComReg considers that where access to NGN infrastructure is mandated, the asset owner should be rewarded commensurate to the degree of risk faced at the time the investment was made. By appropriately reflecting the associated investment risks in the regulated access price, ComReg believes that regulation can best ensure that the incentives for investment are not distorted, while ensuring competitive access and preventing any abuse of market power.

3.5 Withdrawal of regulated wholesale products

It is inevitable that the introduction of NGNs will change the economics of the telecoms industry. In turn, this is likely to affect the existing portfolio of wholesale products. As the technological capabilities of OAOs develop and cost structures change, it may become reasonable and efficient to facilitate the withdrawal of certain wholesale product obligations. Given that NGNs in Ireland are likely to be implemented over a number of years, it is unlikely that these product changes will be *en bloc* and a number of product withdrawal scenarios are possible:

(i) the withdrawal of certain regulated products completely,
(ii) the withdrawal of features of certain regulated products; and/or
(iii) the withdrawal of products from certain sites or locations.

In the case of scenario (i), under Article 27 of the Framework Regulations the withdrawal of such an obligation can only occur following a finding of effective competition in the relevant market. As such, ComReg would need to undertake a Market Review, conclude that the relevant market was effectively competitive and provide reasonable notice to any parties likely to be affected by a withdraw before it could withdraw an obligation completely.

In the case of scenarios (ii) and (iii), ComReg may consider it proportionate and justified to facilitate withdrawal of these elements without undertaking a Market Review. For example, if it was no longer cost-effective to continue to support certain legacy product features in an NGN environment,[12] or alternatively if a more efficient network architecture could be implemented though the relocation of certain sites, then ComReg would consider the case for facilitating such requests subject to the following criteria being met:

[12] For example due to architectural differences between PSTN and SIP signalling, it is claimed that certain services that depend on centralised intelligence may be difficult to emulate in an NGN environment. See Light Reading, 'The Role of IMS in PSTN-to-VoIP Migration' Dec. 2005.

(i) the SMP operator has provided sufficient advance notice and has held discussions within appropriate industry fora with the OAOs affected to discuss and agree product evolution options prior to withdrawal;
(ii) there is no adequate customer base to create a reasonable level of demand, thereby making ongoing service provision uneconomic and disproportionate;
(iii) where appropriate, a functionally and economically equivalent alternative to that being withdrawn is available and a seamless migration is provided;
(iv) the majority of end-users have migrated from the legacy solution and a clear timetable has been provided for the withdrawal of the remaining users.

ComReg will apply these criteria on a case-by-case basis taking into account the particular situation of each case, the importance of relevant product in the relevant market, and the degree of consensus amongst industry players for such withdrawal.

ComReg believes that the application of these criteria and in particular the provision of appropriate advance notice on product withdrawals can help substantially mitigate the potential for stranded assets. Such safeguards are necessary to enable competiting operators to make commercial decisions with a relative degree of confidence. However ComReg also recognises that in the migration to NGN these safeguards may not completely eliminate the risk of some stranding of assets – particularly those with economic lives that extend beyond normal industry technology lifecycles[13]. In those instances, ComReg believes that if an SMP operator seeking to withdraw a regulated product has followed and met the criteria outlined above to ComReg's satisfaction and the prospect of significant stranded assets still remain, the SMP operator should discuss and agree relevant compensatory principles with the parties affected. ComReg believes these discussions should be on a non-discriminatory basis.

[13] e.g. underground ducting

4 NGN Impact on Existing Wholesale Products

The introduction of NGNs inevitably leads to questions about which regulatory obligations will apply and which will not. Such uncertainty can be of concern to investors, incumbents, OAOs and regulators alike. In this section, ComReg outlines how it expects the introduction of NGNs in Ireland will affect existing regulated wholesale products in the short to medium term.

4.1 Local Loop Unbundling

Local loop unbundling (LLU) has been a key enabler of infrastructure competition across Europe in the provision of fixed line telecommunications services, in particular broadband internet access. It enables competitors to differentiate their services, assume greater control over their products and market positioning, and secure dedicated access to the physical infrastructure that connects their customers. Although eircom has announced plans to deploy NGA infrastructure in some urban locations, ComReg envisages that LLU will remain an important competition-enabler, particularly given eircom's commitment to retain its copper infrastructure for the foreseeable future (see below).

LLU is one of the access obligations that ComReg imposed on eircom after it was found to have SMP in the market for wholesale unbundled access to metallic loops and sub-loops (i.e. Market 11)[14]. Accordingly, that obligation cannot be removed without ComReg first conducting a further market review and concluding that the market has become effectively competitive.

Whilst ComReg recognises that the transition to NGNs can create a degree of uncertainty for those operators that currently utilise LLU or are considering doing so, it does not want to see this hinder the adoption of LLU. To this end, and to eliminate any regulatory uncertainty regarding the future of the LLU access obligation, ComReg will soon commence its second review of the market for wholesale unbundled access to metallic loops and sub-loops. Amongst other things, the review will assess whether the competitive conditions that warranted the introduction of the LLU access obligation still remain, and whether the obligation should be retained. If the competitive conditions have not changed substantially and if eircom is found to still have SMP, then ComReg would be minded to maintain the existing LLU access obligation for the duration of this review. ComReg expects that this Market Review will cover the period up to approximately December 2011.

ComReg is also aware of some concern that LLU may become unavailable in certain areas if eircom's transition to NGNs entails the removal of the main distribution frames (MDFs) from local exchanges. However, ComReg notes that eircom has not signalled any intention or desire to remove MDFs or copper pairs from any sites for the foreseeable future. Indeed, as recently as March 2007, eircom stated publicly that its plans would have 'no impact on existing OAO wholesale services' and lead

[14] ComReg D8/04: *Designation of SMP and Decision on Obligations: Wholesale Unbundled Access (including shared access) to metallic loops and sub-loops*

to 'no change in…LLU'[15]. As such, ComReg does not foresee the removal of MDF access[16] from any site in Ireland during the period of the forthcoming Market Review unless:

(a) the upcoming Market Review shows the market to be effectively competitive; or
(b) a change to eircom's current position is announced publicly.

Should the latter scenario arise, ComReg would be guided by the criteria set out in section 3.5 above in any consideration of a request to withdraw MDF access at a particular site. Given the importance of MDF access for LLU competition and the risk of stranded assets should it be withdrawn from particular sites, ComReg considers that the provision of a functionally and economically equivalent alternative and an advanced notice period of between three and five years would be warranted prior to any intended withdrawal of MDF access.

An additional consideration of the co-existence of current and next generation networks is that the technologies deployed must not interfere with one another. One protection around this area is the requirement for all services or technologies deployed over the eircom copper network to comply with the Copper Loop Frequency Management Plan (CLFMP). This plan is not strictly constrained to LLU but it should be noted that the constraints imposed by the plan are relevant to operators connecting equipment to the eircom copper network and this plan must be adhered to. Before any new technologies such as cabinet-based VDSL services can be launched, there must be industry agreement to change the plan to facilitate the deployment of such technologies.

4.2 Bitstream Services

Whereas LLU enables an OAO to gain access to the physical line connected to its customers' premises (that is, layer 1 in the OSI model), wholesale bitstream access is provided at either layer 2 or 3, that is, behind the active access equipment at the MDF (or equivalent). As a result, an OAO utilising wholesale bitstream access does not have the same capacity to control the quality and other key parameters of its retail service offerings as it would if it were utilising LLU. While this limits the scope for product innovation and dynamic efficiency gains, wholesale bitstream access is an important enabler of service competition and source of static efficiency gains.

ComReg found eircom to have SMP in the market for wholesale broadband services (market 12) and imposed an obligation to provide wholesale bitstream access. That

[15] Presentation by eircom Chairman, Pierre Danon, titled Working to put Ireland at the forefront of the broadband revolution, 8 Match 2007. Refer slide 21 of 28 at http://www.comreg.ie/_fileupload/publications/PDanon.pdf

[16] The term 'MDF access' refers to the obligation on eircom to provide OAOs with access to copper loops at the MDF in the local exchange. It should be distinguished from 'SDF access' which is the obligation on eircom to provide access to copper loops at the street cabinet or sub-loop distribution frame (SDF). Both forms of access are obligations arising on a finding of SMP in the LLU mkt (Mkt 11) and are commonly referred to in the singular as 'LLU access'.

obligation applies to the range of bitstream products in eircom's existing product portfolio irrespective of technology or speed, together with any substitute bitstream products that eircom may introduce in the future.

Given the relationship between the WBA and LLU markets and the remedies imposed in each, ComReg will review these markets in parallel. These reviews will commence in the coming months.

4.3 PPCs / Wholesale Leased Line Services

Whilst bitstream services facilitate the delivery of asymmetric services, operators that wish to provide symmetric data and/or 'leased line' services typically use other regulated wholesale products, namely wholesale leased lines and private partial circuits (PPCs). Generally, these products are used as inputs for the terminating segments of a leased line service, with the operator's own network infrastructure forming the main trunk segment. When assembled together these elements enable the offering of various retail services typically to larger business and corporate / government users - including leased lines, VPNs and a range of data management and network services.

The regulation of leased line services stems from ComReg's findings in 2005 review of the market for retail leased lines and wholesale terminating and trunk segments of leased lines (markets 7, 13 and 14 respectively)[17]. In defining the retail market, ComReg found that although a variety of managed data services[18] could be considered as functionally equivalent to traditional leased line services, there was insufficient demand to warrant their inclusion in the market. Consequently ComReg limited the scope of the market to point-to-point dedicated capacity services or TDM-based[19] services only.

At the wholesale level, ComReg identified two distinct leased line markets: one comprising terminating segments and another comprising trunk segments. eircom was designated with SMP in both markets leading to the imposition of obligations of access, transparency, non-discrimination, accounting separation and cost orientation.

ComReg is currently conducting a further review of these markets and will publish its initial Consultation later this year.

4.4 Voice Products – narrowband access and calls

Operators that wish to provide voice services can configure their use of the various wholesale products in different ways in line with their particular service strategies and infrastructure assets. Operators with their own access infrastructure typically obtain interconnect, transit and/or call termination services to onward route their

[17] See ComReg 05/29 (D7/05) – Market Analysis: Retail Leased Lines and Wholesale Terminating and Trunk Segments of Leased Lines (National).

[18] e.g. IP-VPNs, ATM, ethernet, and SDSL services.

[19] Time division multiplexing

traffic to called parties whereas OAOs without access infrastructure generally also require an indirect access solution (such as CPS) or a wholesale line rental (SB-WLR) service. A flexible range of wholesale products is important to accommodate different circumstances and enable competition in the voice services market. The transition to NGN will not change this, at least for the short to medium term.

4.4.1 Narrowband Access

The obligation to provide wholesale voice products extends across a number of defined markets. The obligation on eircom to provide CPS and SB-WLR, along with supporting obligations to assist in the implementation and development of these products, arises out of an SMP finding in the fixed narrowband access markets in 2005 (markets 1 & 2). ComReg is currently reviewing these markets again and is proposing to retain all existing obligations, including a retail minus price control, if SMP is found to still exist. ComReg proposes to consult shortly on the relevant margin available to other operators over the period of the review.

ComReg notes that eircom's NGN plans provide for the emulation of existing PSTN services[20] over their NGN and as such no major changes to the existing WLR product are expected. However, if there are proposals to change - or more specifically, withdraw - certain elements of the WLR product set, ComReg will have regard to the criteria in section 4.4 before approving any such withdrawals.

4.4.2 Fixed Calls

The obligations to provide interconnect, transit and fixed call termination services emanates from decisions in the defined fixed interconnect markets (markets 8-10). In the call origination and transit markets, ComReg is proposing to designate eircom with SMP and to apply consequential remedies of access, non-discrimination, transparency, cost accounting and price control. These remedies are in line with existing obligations and as such ComReg does not expect NGN deployment to significantly affect the scope of these products. However, ComReg will keep interconnection developments under review.

In the fixed call termination markets, ComReg is proposing to define markets for wholesale call termination to end-users on individual networks. ComReg proposes to designate eircom and a number of OAOs who have control over end-user access infrastructure with SMP, but to apply proportionate remedies to reflect the differing competitive conditions.[21]

As part of its consultation on the fixed interconnect markets, ComReg sought comments from industry on the use of a wholesale price cap (WPC) for setting interconnect charges. ComReg sees merit in the application of a WPC as it limits the ability of an SMP operator to set excessive charges, while also providing increased certainty as to the level of future charges. Increased certainty facilitates better

[20] PSTN emulation services provide POTS/ISDN services on an NGN core network to traditional phones and terminals through POTS/ISDN line interfaces.

[21] The OAOs specified are BTIreland, Verizon, ntl, COLT, Smart and Magnet. See ComReg 07/03 for more details.

business planning and can boost operator confidence in longer-term investments such as NGN. Furthermore, as a WPC sets rates on a CPI+/-*x* basis, the SMP operator should be given an incentive to increase its wholesale efficiency as much as possible and may be in a position to retain the savings created by increasing efficiency by more than the value of *x*.

4.4.3 Mobile Calls

Similar to the fixed call termination market, ComReg has also defined markets for wholesale voice call termination on individual mobile networks. ComReg has designated Vodafone, O2 and Meteor[22] as having SMP in the market for voice call termination on their respective networks and has imposed obligations of access, transparency, non-discrimination, and price control on all three, with an additional obligation of accounting separation imposed on Vodafone and O2. ComReg does not expect the regulatory status of Mobile Termination to change for the foreseeable future.

[22] A ComReg decision to also impose SMP on '3' (Hutchison 3G Ireland) was annulled by the ECAP and at present there are no SMP obligations on 3. Recently, however, ComReg undertook a review of the market for wholesale voice call termination on 3's mobile network and is of the preliminary view that 3 has SMP in this market and that obligations of transparency, non-discrimination and price control are appropriate.

5 Impact on Future Wholesale Products

Whilst ComReg's short-term priority is to clarify its intentions for the existing suite of regulated wholesale products, its long-term priority is to resolve the matter of what future regulatory products might be required and what those products might consist of. Although ComReg is presently unable to know what particular regulatory products will be needed in an NGN environment in an effort to stimulate consideration of these issues, this section outlines some of the potential competition remedies that are being explored within the European Regulators Group (ERG) and elsewhere.

5.1 Migrations

Regardless of precisely what new wholesale products are developed it is essential that effective migration processes from existing products are put in place and that this is understood in advance. Operators must have the assurance that they can invest in their businesses using currently available wholesale products with the assurance that they will have the option, if they so choose, to migrate to new products when they become available.

5.2 Sub-loop Unbundling (SLU) and Sub-loop Distribution Frame (SDF) access

Across Europe, the deployment of fibre further in access networks as part of the transition to NGNs is focusing attention on the potential for sub-loop unbundling and access to the incumbents' sub-loop distribution frames (SDFs). SDF access involves unbundling the sub-loop and providing access at the street cabinet to the physical wires that run from the cabinets to the homes and premises of the end-users.

In countries where incumbents have begun deploying fibre to the cabinet (FTTCab), SDF access is seen as one way of continuing to facilitate infrastructure competition in the access network. SLU is available in Ireland[23] but as it has not yet been taken up, the associated processes have not yet been tested. Given the developments on LLU over recent years it is quite possible that development work will be required to bring the SLU product to a satisfactory standard to meet OAOs' needs. However, before any decision can be made on whether or not to proceed with such work, industry participants need to consider the various regulatory and commercial issues that are likely to determine the viability - and hence, demand - for any SLU product.

The key to commercial viability for any SDF access product seems to be localised economies of scale. These in turn are primarily influenced by two sets of variables:

(i) the topology of the network that is being unbundled, which determines the number of customers served per street cabinet and the ratio of cabinets to exchanges; and

[23] This is the result of an access obligation imposed by ComReg in the market for wholesale unbundled access to loops and sub-loops for broadband and voice.

(ii) the potential of the market, in particular the potential demand for new services, the prospective new entrant market share, and the possible increases in average revenue per user (ARPU).

These variables will differ from country to country and from location to location within countries, with different economies likely to exist in different geographic areas and markets. Accordingly, it may be the case that SLU is only a viable option for new entrants in certain market segments and within certain areas.[24]

To overcome some of the limitations imposed by these scale economies, it has been suggested[25] that certain regulatory measures could improve the business case for any SDF access product. In particular, it has been put forward that mandating access to certain facilitates could reduce the capital cost for new entrants. The ERG has identified two potential bottlenecks which may require new or adjusted wholesale access products:

(i) backhaul between the cabinet and the OAOs' network ('SDF backhaul');
(ii) co-location at the street cabinet.

Further information on these potential regulatory options is provided below.

5.2.1 SDF backhaul

The most significant costs incurred by an OAO in any deployment of its own access network infrastructure are civil engineering costs, such as digging trenches or building new ducts to house cables. Such costs can represent as much as 80% of the total cost per subscriber.[26] It has thus been suggested that the availability of a regulated SDF backhaul product could significantly reduce network deployment costs for new entrants and thereby encourage greater competition.

But before any such measures could be adopted it would first be necessary to identify which defined market an SDF backhaul product would fall within. ERG have identified a number of possibilities in this regard which include considering SDF backhaul as:

(i) an ancillary service to the shortened local loop or sub-loop thereby falling within the boundaries of Market 11;
(ii) a wholesale terminating segment of leased lines (Market 13); or
(iii) a new separate 'backhaul market' for which a new market would need to be defined.

In addition to identifying what relevant market SDF backhaul is in, NRAs will need to consider what form that backhaul should be provided. SDF backhaul, like any backhaul, can be provided in a number of forms and proportionality requires that NRAs give due consideration to the varieties possible. For instance, if SDF backhaul

[24] For instance, the Analysys study commissioned by OPTA, *The business case for sub-loop unbundling in the Netherlands*, concluded that SLU might by viable option to target business customers but not as a mass market solution.

[25] ERG *ERG Consultation Document on Regulatory Principles of NGA* (ERG (07) 16)

[26] Ibid. p.vii

is considered an ancillary service to Market 11 [i.e. option (i) above], ERG have suggested that duct access (i.e. access to the SMP operator's ducts), along with dark fibre or wavelength access, could represent possible means of providing this backhaul. As these products typically operate at the physical layer (i.e. layer 1), they offer competing operators greater levels of flexibility and independence in developing their service offerings. In addition these forms of access may have been identified as being potentially appropriate in situations where the use of a shared medium makes traditional 'unbundling' options impractical[27].

Alternatively, SDF backhaul could be provided by means of a managed backhaul solution at layers 2/3, such as some form of ethernet-based backhaul solution. Ethernet solutions are currently used in a number of countries to backhaul current generation broadband services from MDF locations[28]. However, it is possible that the costs associated with a managed backhaul service could quickly become prohibitive in comparison to a physical layer backhaul option given the trunking capacity required to support such bandwidth-hungry services as IPTV, and the number of (SDF) sites that would need to be supported.

5.2.2 Co-location at Street Cabinet

A second major obstacle for a new entrant considering entering the market by means of a sub-loop product is the significant barriers associated with installing its own street cabinet. Potential entry barriers exist not only in terms of the high monetary cost of purchasing and installing cabinets to service a relatively small number of customers, but also in terms of the difficulties of gaining planning permission from local authorities for the build out of new street furniture. These entry barriers may be sufficiently large such that the street cabinet represents an enduring economic bottleneck. In such circumstances there may be a case for arguing that, as an associated facility of market 11, the relevant SMP operator in that market should be mandated to provide co-location space and other facilitates as required within their cabinet.

In terms of the equipment that would need to be installed in a street cabinet, this could include: DSLAMs[29] or MSANs[30], splitter devices to provide shared-line services, ODFs[31] for terminating any fibre backhaul, tie cabling, power supply units, monitoring facilities and space for a cable grid and fan/airflow. Since space in street cabinets may be scarce, some of these facilities could potentially be shared by operators. If known at the outset, the SMP party could potentially take the needs of all interested parties (including its own) into account when initially designing its cabinet solution. Such an approach would likely lead to a more efficient solution than the retrofitting of OAO requirements after the SMP operator has rolled out its cabinets. However numerous difficulties and practical problems would need to be addressed first – not least the development of certainty around several key variables

[27] Ibid. p45/93. For example ERG have suggested that duct sharing may also be a relevant wholesale option in a point to multi-point PON scenario.

[28] See OpenReach WES Product Handbook.

[29] Digital Subscriber Line Access Multiplexer

[30] Multi-Service Access Node

[31] Optical Distribution Frame

such as demand forecasts for OAO collocation requirements, procedures for facilitating access to cabinets, power supplies, etc... and the cost allocation principles for allocating cabinet and other costs.

5.3 Next Generation Bitstream Products

Given the commercial challenges associated with the SLU business case, some market commentators have speculated that there may be greater industry demand for a less infrastructure-intensive wholesale alternative. Conceptually such a solution would combine the lower infrastructure requirements of bitstream with the higher capacity and greater functionality possible in an NGN/NGA environment. Thus, unlike current generation bitstream products which provide primarily 'best-efforts' broadband and are launched from the local exchange, it is expected that so-called next generation bitstream services will, in addition to broadband, offer multi-cast capabilities, though this will require the deployment of fibre deeper in the network. Such offerings are beginning to emerge elsewhere in Europe where it is expected they will facilitate the delivery of competitive triple-play offerings[32]. In time, this could potentially increase the attractiveness of bitstream products over alternative wholesale access products, although changes to current services level agreements to more appropriately reflect the evolving needs of both other operators and end-users would be required.

As regards the future regulatory treatment of these services, in the absence of specific examples it is difficult to be definitive. ERG have suggested that these products would fall into the WBA Market. This is based on the expectation that competing operators will access this service at a higher layer in the communications protocol stack than for unbundled access. In this way ERG believe these products can be distinguished from Market 11 products (LLU Mkt), as they are likely to involve the allocation of a managed data steam by the SMP operator at layers 2/3. Ultimately however the relative position of services vis-à-vis relevant markets is determined by economic substitution. As such where these new services are found to be sufficiently interchangeable or substitutable with existing bitstream services, ComReg will consider them as falling within the boundaries of the WBA market.

As regards the possible make-up of any regulated product, this is difficult to predict as operators are deploying differing NGA network architectures[33], may offer handover at various levels in the network and the extent to which multicast capabilities will be embedded in the access network as opposed to the core network has yet to be determined. In the absence of such details, it is difficult to provide much guidance as to the possible make-up of any regulated product, although in its considerations ComReg will carefully assess the requirement for non-discrimination. It should be noted that such considerations extend only to the underlying transport services and related facilities and not to the provision of content carried over that transport layer. ComReg considers all content and similar high layer applications as falling outside the scope of the WBA and all market identified for ex-ante regulation.

[32] Where such solutions are being offered, Ethernet VLANs are emerging are the preferred delivery option. See KPN Wholesale Technische specificaties Wholesale Broadband Access Versie 1.1, 20 November 2006.

[33] e.g. FTTCab vs a FTTH or GPON architecture

5.4 Next Generation Leased Line Products

The leased line markets are concerned with the provision of point-to-point connections and capacity dedicated to the use of specific customers. The relative lack of alternative solutions has meant that historically these services have generally been provided for by way of traditional TDM-based circuits. Comprising of dedicated point-to-point connectivity, these uncontended solutions offer high levels of security and reliability, but are not as well suited for the increasing volumes of 'bursty' IP-based traffic driven by growing broadband adoption. As a result where previously only dedicated TDM-based leased lines would have been considered, service providers are now seeking to migrate to more cost-effective contended and alternative solutions based on SDSL, Ethernet and other technologies[34]. Ethernet in particular is increasingly being adopted in the backhaul and higher capacity market segments as TDM-based circuits become no longer cost-effective[35]. SDSL services are also gaining in popularity and are primarily used by LLU operators to offer business customers lower-cost leased line replacement services. To date both these technologies have been used mostly for symmetric data services, although ongoing improvements in QoS mechanisms offer the prospect of also delivering voice and other real-time services over these links in the near future.

In its next review of the Leased Line Markets, ComReg will consider whether these contended and alternative solutions can be considered substitutes for existing TDM-based leased line services. If this is the case, and if competition problems are found to exist in these markets, then ComReg will act accordingly, in line with its responsibilities to encourage innovation and protect consumers.

[34] e.g. ATM, MPLS

[35] For example eircom recently added an ethernet-based bitstream connection services (BECS) to their bitstream product portfolio. Previously only leased line-based solutions were available for this service. Ethernet links are also being used to plug into ethernet-based VPN / WAN solutions - see eircom's Metro Ethernet to Business IP+ (BIP) Interconnect.

6 Next Steps

ComReg is working with industry and other stakeholders to facilitate a smooth and speedy transition to NGNs. In addition to its participation in the NGN Industry Steering Group, established in May 2007 and related work Groups addressing specific NGN core and access issues, ComReg also has a number of NGN-related projects underway, principally in the areas of pricing reviews and market reviews. These include:

Pricing reviews

- ComReg is currently reviewing eircom's regulatory Weighted Average Cost of Capital (WACC). Key considerations in determining an appropiate WACC include an assessement of the risk profile associated with various existing or planned network invetsments, such as NGNs, over the relevant review period. A consultation paper on the review of eircom's regulatory WACC will be published later this year.

- In coming months ComReg will engage with eircom on a suitable price cap for Wholesale Interconnect Conveyance Rates, taking into account the effect, if any, of eircom's proposed transition to an NGN core. This exercise will be informed by eircom's LRIC separated accounts and a core network cost model, which is currently being developed by ComReg.

- Purusant to ComReg decision D15/04, the price of a fully unbundled loop will increase by the Consumer Price Index on 1 December 2007.[36] ComReg has commenced a review of the costs associated with eircom's access network to inform future pricing trends for LLU and other regulated products which relate to eircom's access network.

Market reviews

- As noted in section 5, ComReg will shortly commence its second review of the markets for wholesale unbundled access to metallic loops and sub-loops (market 11) and wholesale broadband access (market 12). The pricing remedy for Bitstream access will be included in this review. These reviews will be conducted concurrently and are expected to be completed as soon as possible.

- ComReg is currently reviewing the market for wholesale leased lines and the pricing remedy that was previously imposed. A consultation paper will be issued shortly.

- ComReg will make a final decision on the markets for fixed call origination, termination, and transit in the coming months.

[36] ComReg 04/110: Local Loop Unbundling, Review of eircom's ULMP Monthly Rental Charge.

6.1 Submitting Comments

Whilst this document is not a formal Consultation, ComReg invites written views and comments on the issues and questions raised in this document. We hope to review these comments when carrying any out further work on issues covered in this Position Statement. When submitting comments, respondents are requested to reference the relevant section of this document. Responses will be available for inspection by the public on request. Where elements of any response are deemed confidential, these should be clearly identified and placed in a separate annex to the main document.

Comments should be sent to:

Sinead Devey
Market Framework
Commission for Communications Regulation
Irish Life Centre
Lower Abbey Street
Dublin 1
Ireland

Tel: +353 1 8049621 Fax: +353 1 8049671
e-mail: marketframeworkconsult@comreg.ie

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