

Policy principles for the Irish NGN regulatory framework

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1. Introduction

This paper sets out a range of possible policy principles for the Irish NGN regulatory framework. It focuses on principles and approaches which reflect the move of Irish stakeholders to Next Generation Networks (NGN) over the coming 5 years.

In October 2006, Ovum developed a briefing paper which was the basis for bilateral meetings held in October and November 2006 with a wide range of stakeholders¹ and a subsequent meeting in December with eircom on their high level NGN access plans. This report results from the inputs of these meetings.

Originally ComReg was seeking high level policy principles to offer the industry some guidance on how NGNs may develop. However, eircom announced plans for fibre in the access network in late December 2006 which means that ComReg now needs to move more quickly to establishing a firm framework for industry. Therefore, where we could add specific detail (based on our own opinion, that of the stakeholders and/or decisions taken in other countries) we have done so, prescribing possible solutions for ComReg to further test with industry. Our proposed policy principles are integrated within the text of the report but, for ease of reference, are shown in ***bold italic*** type.

The set of possible policy principles must support the following objectives:

- 1) to facilitate efficient investment in NGN and other new technologies, products and services while maintaining a competitive environment for infrastructure and services
- 2) providing consumers with adequate protection such that the move to NGNs will not impact current service offerings and customer rights.

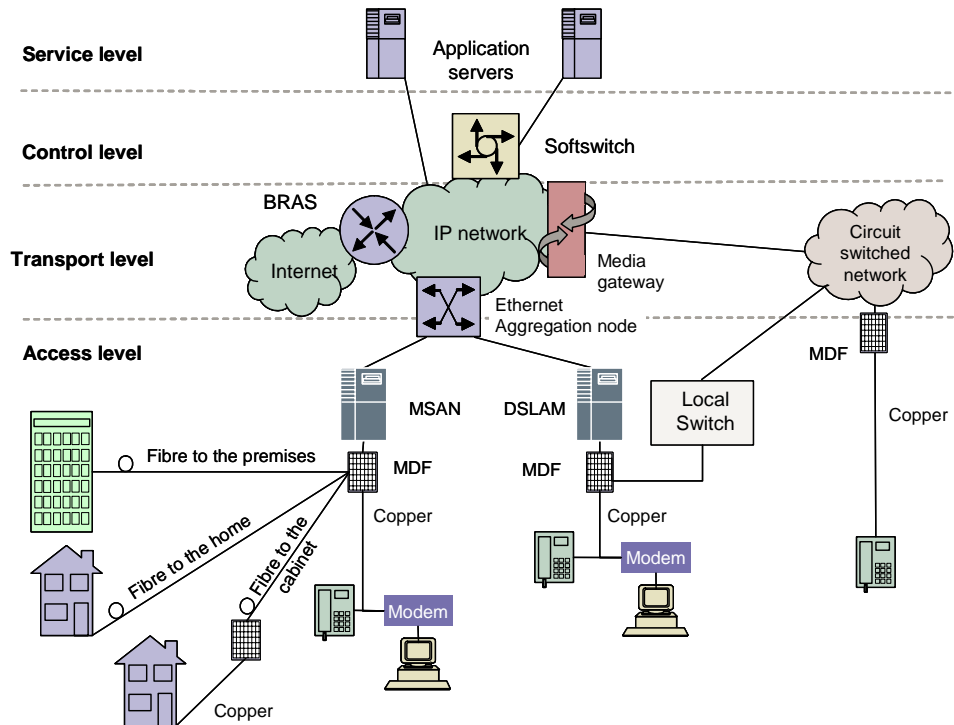
We have drawn on NGN regulatory approaches in other countries, especially to the Netherlands and the UK, which seem to be leading the way in Europe. The purpose of this is simply to illustrate possible policy approaches in Ireland. However, we are aware that there are differences between these countries and Ireland, both in terms of the incumbent's NGN plans and the relevant powers of the regulator. For example, in the UK Ofcom can make a reference under the Enterprise Act should it need to enforce a solution; such a power does not exist for ComReg.

1.1 Definition of an NGN

In Figure 1.1 we illustrate a typical NGN inter-working with today's PSTN network.

¹ ALTO, BT Ireland, Blueface, Cable and Wireless, Chambers Ireland, eircom, eNet, Magnet, O2, Smart, UPC, Verizon, Vodafone

Figure 1.1 Typical NGN architecture with PSTN interworking



Our definition of an NGN includes the following:

- A single, IP-centric network
- The separation of the services and service control layer from the network to allow rapid development of new services
- The capability of supporting multiple low and high bandwidth services including mobility, rich voice and multi-media services.

The remainder of this paper is as follows:

Chapter 2 examines the possible policy principles for core² NGN in Ireland.

Chapter 3 discusses the key issues for the Irish market.

² By Core NGN we refer to the network from the MDF in the local exchange into the core of the network. The access network refers to the point at the customer premises to the line side of the MDF.

2. Possible policy principles

There are six areas which will need consideration for proposed policy principles in order to meet the objectives of facilitating competition and investment in NGNs, as well as protecting consumers during and after migration.

We propose a set of possible policy principles for each area, as well as reviewing potential industry mechanisms for implementation of NGNs.

The six areas are:

- Future industry mechanisms
- NGN design and architecture
- Current wholesale SMP products including migration issues
- Interconnect issues
- Next generation wholesale products with SMP
- Consumer protection.

2.1 Future industry mechanisms

When an incumbent operator wishes to undertake major changes to its network infrastructure, there is a need to balance its needs and wishes with those of other operators / service providers, customers, and the policy / regulatory requirements to stimulate competition at the infrastructure and service levels. There will be valid issues raised by all parties, some of which will be resolved through commercial negotiation, but many that can only be resolved in a cross-industry forum. There should certainly be a desire (which has been expressed by many parties in Ireland) to contain the volume of work in addressing these issues, but nonetheless, there will be a minimum set of tasks which will need to be addressed collaboratively. This will demand a level of commitment and resource from the major parties involved which needs to be budgeted for in business plans.

2.1.1 The situation in the UK

The country which is most developed in its cross-industry working for NGN deployment is the UK. To illustrate the scope of activity in the UK, the three major bodies involved are:

- Consult21 which is the industry group set up by BT to discuss and disseminate plans on BTs NGN including interoperability and future products and services.
- the Network Interoperability Consultative Committee (NICC) whose remit is the technical implementation of standards in the UK
- NGNuk whose focus is on developing the technical and commercial framework for NGN interconnection and examining network intelligence interoperability

Consult21

Consult21 is the forum created by BT to create, manage and own a framework within which industry and BT can agree on BT's 21st Century Network (21CN) interoperability, and consult on the development of next generation products and services, including access and interconnection products. These consultations take account of associated contracts, timelines etc, Ofcom policy, BT's network capability and industry requirements.

Consult21 sub groups consider:

- underlying NGN network architecture and functionality
- the means for operators to access (and control) network systems, network elements and control-plane resources in another operator's network
- the impact on existing services with particular reference to possible withdrawal and transformation issues, including new services and their definition:
 - LLU and bitstream service
 - voice services
 - data services
 - interconnect services
- the architecture, development and interfaces of Operational Support Systems (OSS), between the incumbent and OAO networks
- implementation and migration issues to minimise the impact on end users
- conformance testing and test processes.

NICC

The Network Interoperability Consultative Committee (NICC) is a pan-industry body that acts as a co-ordination forum in which key players in the telecommunications sector (communication providers, service providers, manufacturers, the regulator, etc) address and agree necessary technical arrangements for interconnection and interoperability for networks and services in the UK. NICC was established by Oftel in 1992 and has developed to be the main forum for discussion and agreement of NGN interface standards in the UK. It is an advisory committee to Ofcom, but as standards development is an industry responsibility, it is planned that the IET³ will take responsibility for NICC.

NICC is concerned with the technical standards and has sub groups which consider:

- Architecture, network requirements and security
- Transport
- Signalling
- Quality of service
- Management issues.

³ The Institution of Engineering and Technology: <http://www.theiet.org/>

NGNuk

NGNuk was established as a result of Ofcom's policy statement, 'Next Generation Networks: Developing the Regulatory Framework' of March 2006. It is an independent NGN industry body to assess and agree the direction for NGNs in the UK. NGNuk provides an implementation framework for interconnection between PSTN replacement NGNs, IP-based mobile networks, VOIP operators, and other relevant future developments in communications networks and services. NGNuk liaises with NICC which undertakes the technical implementation of standards for the UK.

NGNuk currently has three work groups:

- Commercial: which develops the commercial and technical framework for the interconnection of NGN networks
- Transport Architecture: which addresses the transport layer requirements and the physical design requirements of the way in which networks interconnect and route traffic with associated quality parameters
- Network Capabilities: which addresses network intelligence and control requirements.

Although the number of people involved in each of these groups varies depending on the work programmes and availability, there are typically 20 people actively involved in NGNuk. The NICC and Consult21 are more difficult to quantify, as much time goes into preparation of papers and meeting schedules for working groups vary in frequency. Typically during each month of 2006, BT's Consult21 forum would have around 8 working group and 25 expert's group meetings. It is estimated that on average there are around 140 person attendances at Consult21 meetings each month. In addition there is additional effort required to prepare papers and provide the management of the forum. NICC Task Groups typically meet every 4-6 weeks and have 6-12 attendees.

It would not be necessary (or practicable) to replicate the UK situation in Ireland, for a number of reasons:

- the size and complexity of networks in Ireland is far less than those in the UK
- the UK forums have evolved and grown over a period of time
- There is less need now for some aspects of the work conducted in NGNuk, particularly as the ETSI standards are now more clearly defined
- there are believed to be fewer non-standard aspects to eircom and OAO networks in Ireland than those in the UK.

However, the UK experience provides evidence that industry-collaboration on NGN developments is complex and involves a substantial commitment from all parties.

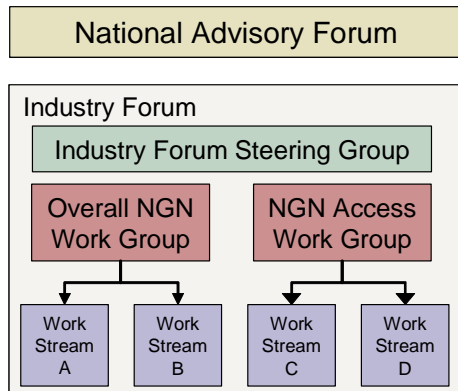
2.1.2 Facilitation mechanisms in Ireland

As the Irish situation is much less complex than the UK, simpler industry mechanisms should meet the Irish needs, but any structure should be periodically reviewed and revised to meet changing needs.

Proposed structure for facilitation bodies in Ireland

Based on bi-lateral discussions with industry and having reviewed the situation in other countries, we proposed the structure shown in Figure 2.1.

Figure 2.1 Proposed structure of new facilitation bodies in Ireland



National Advisory Forum

There are many programmes, initiatives and bodies involved in broadband and network development in Ireland, and there is a need for co-ordination between all of these programmes. We therefore propose the establishment of a high-level body the remit of which includes NGNs but extends more broadly to incorporate policy issues such as the future of broadband networks and overcoming the digital divide.

We propose that ***a national advisory forum⁴ is established to assess the long term direction of the industry and link policy, regulation and commercial interests. The national advisory forum will also provide overall policy guidance to other cross-industry forums, which are more focussed on implementation.***

⁴ This body was announced by the Minister for Communications, Marine and Natural Resources at the ComReg NGN Forum on 8th March 2007

This advisory forum would also ensure co-ordination with groups such as Forfás and the Telecoms and Internet Federation (TIF, part of the Irish Business and Employers Confederation), and broadband stimulation projects in Ireland. These include the initiatives resulting from the National Development Plan 2007 – 2013, including the Communications and Broadband programme, the Nationwide Broadband Scheme and the MAN projects.

There are a number of issues which the forum might wish to consider, related to the development of infrastructure and competition in Ireland:

- How will the new 'digital divide' be addressed in Ireland? The historic situation whereby some lines had access to broadband service and some did not is now being overcome as the deployment of DSLAMs in rural and small exchanges progresses, complemented by initiatives to bring broadband to all potential users. However, some consumers will have access to increasingly high broadband and associated media services, while some will be restricted by issues of loop length, access technology or service availability to low capacity broadband (<1Mbps) or none at all
- Will there be economic / network bottlenecks to deploying competitive access infrastructure? The issue of economic bottlenecks is still relevant and the scope of the problem needs to be understood in order that appropriate policies are established
- What is the sound economic approach for geographic coverage: population density, social policy, demand for services? Competitive providers will of course be driven by consumer demand, but the Advisory Forum needs to assess the direction required to meet government policy.

Industry Forum

At a more detailed, technical (network, products and regulatory) level, there are many issues which will need to be addressed to help bring NGN to Ireland in a co-ordinated way which maximises benefit for the economy. The issues include, for example:

- to develop plans for the withdrawal and transformation of LLU and bitstream products, including commercial issues, new products/ services, timeframes
- issues related to the maintenance of and migration of voice and non-voice wholesale services
- to plan and implement revised interconnect arrangements, including the agreement of interfaces, planning rules and frameworks for the development and implementation of new networks and systems
- to agree interface between data systems and Operational Support Systems (OSS)
- to develop and introduce new products enabled by NGN
- NGN trials, inter-working and conformance testing
- to ensure the interests of end users is catered for.

It is important that clear information about eircom's NGN migration and NGN access plans are shared with the industry in order that the level of complexity and impact that eircom's changes may have on the industry can be assessed. Discussion between ComReg and the industry will help determine the impact the deployment may have on competition and consumer welfare, and allow ComReg to decide what policy is appropriate.

There are several ways in which communications to address these issues within the industry could be managed in Ireland. Opinion was mixed on whether all technical, standards and interfaces issues should be discussed within the Working Group / Work Stream structure. Options for discussion include:

- Cross-industry forums which operate with the involvement of relevant members of industry: eircom; MNOs; OAOs; ComReg
- Bilateral discussions between parties, which can be effective if the issues being discussed affect only the two parties
- A combination of the two. In this case any bilateral discussions which have industry-wide implications would be reviewed and agreed at the cross-industry forum.

It is expected that some issues will be addressed through bilateral discussions, especially more technical issues which may affect two parties only. Guidelines for this should be established at an early stage and it is recommended that all standards and interfaces issues, and any issues which might concern the wider community, are reviewed within the appropriate Work Group / Work Stream.

Eircom sees benefit in sharing NGN information at an early stage and most OAOs felt that a combination of approaches would be most beneficial. Noting the high level of participation needed in the UK NGNuk, NICC and BT's Consult21 programmes, all parties wanted light touch industry mechanisms which allow issues to be resolved, without being unduly burdensome.

There will be many detailed technical issues to be resolved to allow NGNs to be implemented in Ireland. The industry representatives expect that the level of discussion necessary to resolve NGN interface and interconnect technical issues will be significantly less in Ireland than has been required in the UK, for several reasons:

- The size of the incumbent's and OAOs' networks are smaller
- There are fewer national variants to international standards implemented in the Irish networks
- NGN standards have developed over the period since the NICC and Consult21 started work on NGN in the UK.

The Work Groups should explore and discuss NGN issues as they progress. These groups may allocate task to specific Work Streams which may cover issues across one or more Work Groups. The initial Work Group structure should be established by the Steering Group.

The timeframes and schedule for these issues should be determined by the Work Group.

As a policy principle we propose that ***a single cross-industry NGN forum should be established to allow NGN technical, interconnect, regulatory and commercial issues to be discussed and resolved. The forum should ensure that issues are identified, defined and resolved in a timely manner to the benefit of all parties. The forum may incorporate existing ComReg Work Groups or Work Streams, if appropriate.***

A suggested structure for the Industry Forum is:

- Top level Steering Group chaired by ComReg, or another independent party. This executive forum would be a steering group which would act in the national interest to ensure a range of commercial, regulatory, technical and industry-process issues are addressed. It would define the Working Groups and their responsibilities. It would provide a framework and timescales for Working Group activity and the terms of reference and processes which govern their operation
- Work Groups to be agreed, with a chairman to be appointed by the top level Steering Group. Suggestions for the Work Groups are provided below
- Procedures established to allow effective and efficient resolution of issues.

More detailed structures were not discussed during bilateral meetings with industry players, but the following may be useful guidelines for the forum:

- The mandate of each Work Group should be reviewed annually. If necessary Work Groups can be disbanded or merged as necessary to help make most effective use of limited resources
- New Work Groups, if required, should be formed quickly with a clear mandate
- Particular issues and principles could be addressed through bilateral discussions which should be formalised in the Work Group forum
- If issues cannot be resolved within guideline timescales, then an escalation route and resolution process would be followed
- All Work Groups (and possibly including existing ComReg Work Groups) should be brought within a single Top Level Steering Group so as to ensure effective and efficient operation of the forum. This should help reduce areas of overlap between working group activities and improve co-ordination

We propose that initially two Work Groups are considered:

Overall NGN Work Group

It is proposed that this group cover overall NGN issues, including architecture and design principles, timescales for notification of network change, service withdrawal, migration. This could include the technical aspects required for LLU, voice and data services, for example, sharing of operational support systems and data. In more detail:

- Over-riding technical standards and interoperability for networks, to cover: architecture; transport; signalling; quality of service and network / systems management; conformance testing
- Commercial matters related to NGN migration: processes for product definition, ordering, fault reporting; cost bearing for product and service development; new charging structures
- Liaison with the current SMP product-related working groups (see Section 2.3.1) for each major wholesale product (CPS, WLR, LLU etc), dealing with commercial and operational issues, such as inter-operator order handling, fault management, timescales for response etc.

- Public interest matters (e.g. emergency issues) and communications with consumer groups.

NGN Access Work Group

This Work Group would specifically address issues related to the development of fibre in the access network, e.g. the type and definition of wholesale access products; criteria for retaining copper access when fibre is also available; operational support issues; timescales for service migration.

We propose that ***ComReg should establish a Work Group to address NGN Access issues. The Industry Steering Group will agree and prioritise the issues to be addressed by the Work Group. This work should be conducted during 2007.***

The areas to be considered by the Industry Steering Group for inclusion in the work group mandate, include:

- The definition of new wholesale broadband access and bit stream products / services, including the need to have flexibility to meet rapidly changing needs for service / media delivery
- The short term and long term plans and requirements for MDF locations and policy guidelines for withdrawal of MDF access
- The need for an equivalent alternative to MDF access
- The implications of overlay FTTC / VDSL on existing LLU
- The need for and definition of sub-loop unbundling products
- The regulatory conditions for sub loop unbundling and backhaul (ducts / fibre) from the sub-loop distribution frame.

It is expected that discussion in the NGN Access Work Group will help inform the ComReg decisions on regulatory policy for NGN Access.

2.2 NGN design and architecture

There were issues related to eircom's design of its network architecture raised during our research with industry. To ensure that a reasonable approach is taken by all parties, these issues must be addressed within a Industry Forum Steering Group, as discussed in Section 2.1.2 of this report.

It is proposed that the NGN Work Group should agree the NGN network architectures to be deployed in Ireland and the functionality of these networks, with respect to areas which impact other networks and inter-working. This might include interface standards, rules, functionality, principles and frameworks that govern the development and implementation of networks and systems. To support the development of NGN in Ireland, we propose policy principles in the following areas.

2.2.1 No foreclosure on network design

The development of NGN infrastructure within a country is not an issue which affects any one network operator individually or all operators separately. The introduction of NGN is a major step in network evolution which typically takes place once in a generation, and all operators are affected by the decisions of others. It is therefore important, and in the national interest, to have networks which inter-work seamlessly and which allow customers to benefit from a high level of competition at the network level and at the service level, with choice of services, application and content.

To meet this national interest, it is necessary that the NGN plans of eircom are discussed within the industry prior to the network design being finalised. This openness is needed at varying levels to ensure that the most effective solutions can be determined and implemented:

- The network architecture will have an impact on the architecture of OAO networks, and on the ability of all networks to deliver services and applications from new types of service provider through interconnected NGNs. The network design will encompass service definition, control and interoperability of services between networks. The boundaries between networks may become more complex, with one operator able to access customer data from another's network
- Technical implementation co-ordination will be needed to ensure that the signalling and data flows between networks allow continuity of services. The implementation stage will cover the development and operation of processes, with timescales which allow all relevant parties to continue to meet their obligations to their customers, whilst allowing return on investment with reasonable depreciation periods for assets.

This importance of consultation and feedback amongst all industry stakeholders was raised by several OAOs with regard to eircom's network design and service architecture. They felt quite strongly that eircom must not be allowed to foreclose the network design prior to thorough discussion as an OAO's design and investment decisions are impacted by the eircom architecture. Equally, the OAOs cannot unreasonably hold up eircom's network design.

As a policy principle we propose that ***wherever possible ETSI or other international standards should be used for NGN developments in Ireland.*** This means that in practice, compared with the NGN working groups in the UK, the forum should cover similar topic areas of Consult21 and NGNuk, but avoid most of the technical standards work of the NICC.

As a policy principle we propose that ***there is a minimum period of 6 months during which eircom and OAOs discuss the high level network and service architecture prior to it being finalised.***

ComReg should ensure that there is a clear NGN fibre access roadmap from eircom with defined timelines. This will allow OAOs the flexibility to plan and build their own networks. The information provided by eircom should include details of street cabinets to enable planning to take account of unbundled sub-loops in due course. This information should include points of interconnect for media and control.

The following issues relevant to NGN access will need to be considered:

- The architecture and design of the fibre access network as this affects the opportunities for sub-LLU and it would be advantageous for there to be consultation and feedback amongst all stakeholders with regard to eircom's network design and service architecture.
- NGN fibre access affects the investment decisions of OAOs in the areas of LLU, duct and fibre infrastructure etc, and sufficient notice by eircom with regard to its network migration plans should be provided.
- It will be necessary to discuss and agree interface and other technical issues to facilitate sub-LLU. These discussion might be held through bilateral discussions or through a cross-industry forum.
- Sub-loop unbundling interconnect charges. Establishing a reference offer and setting the correct price for sub-loop interconnect services will be very important to facilitating competition in the access network.

The National Advisory Forum may need to consider whether appropriate incentives are needed to encourage the development of next generation access networks, given the relative risk/ reward profile; and to consider the correct balance between competitive supply, market demand, regulatory policy and government intervention?

2.2.2 Adequate notice regarding unbundled network access and network migration

All OAOs raised the issue of sufficient notice by eircom with regard to their network migration plans - once the network design and service architecture are established.

As discussed in Section 2.1.2, ComReg should establish effective mechanisms for information to be shared and agreed across the industry and that eircom provides adequate details of its NGN strategy, architecture and design to industry. The details and the level of information to be divulged, how is it divulged, the process and appropriate notice periods should be agreed within the cross-industry forum.

Two issues need to be separated regarding the notice period for eircom's intent to relocate its MDF at a particular location. The level of notice should vary, depending on the level of OAO investment which might be affected:

- if an eircom local exchange is being removed or relocated to another site, or the MDF position changed, this could affect an OAO's investments in LLU DSLAMs, voice interconnect and voice switching, backhaul fibre and ducts. In this case, it is reasonable that the alternate operator should be able to recover *some* of its investment based on typical accounting depreciation periods. Typical depreciation periods of infrastructure are 5 years for DSLAMs, 30 years for ducts and 15 years for fibre. While the major cost elements are easily identified, they may vary substantially between sites (e.g. backhaul costs will vary depending on whether it is own-built with ducts and fibre, or leased capacity). Depending on the level of investment and the degree of change at an exchange / MDF site, a notice period of 5 years may be considered appropriate. In practice the period may be less than this if agreement can be reached

between the parties. It is important however that OAOs put in place their own migration plans from the moment that eircom announces a change to a local exchange.

- if an OAO is planning investment at the site, but does not yet have infrastructure in place, the OAO may not wish to commit effort to the planning and design of its infrastructure if eircom's local exchange or local loop infrastructure is subject to change. In these circumstances it is recommended that a notice period of 3 years is given by eircom for advance plans, and a 2 year period of notice for implementation. This allows alternate operators to plan their investments with good visibility of eircom's plans.

OAOs' views of an adequate notice period ranged from 2 years to 5 years. Eircom indicated closer to 2.5 years.

We propose that ***guideline notice periods for unbundled network access and network migration should be set by ComReg after discussion with industry. These should be set to take account of the OAO's sunk investment, the remaining depreciation periods on these assets, and the extent to which these assets could be stranded, and the investment risks that a new entrant may reasonably be expected to bear. Typically we would expect notice periods of up to 5 years from the date of formal notification to ComReg.***

There is a general obligation on eircom to maintain SMP products and services regardless of its NGN plans. If eircom wishes to progress with its NGN migration in a timeframe which does not allow a reasonable depreciation period for OAO investments, then it should be liable for reimbursing the losses of the OAO.

2.3 Current wholesale SMP products including migration issues

It is important to have well-established product definitions and processes for wholesale products and services provided by eircom at all times. This is particularly important during a potentially disruptive period of migration and where there may be limited options for OAOs to introduce services in the absence of appropriate wholesale services from eircom. The processes need to identify the information which should be made available between operators, ordering information and the timeframes for action. The processes should identify escalation procedures to be followed in cases where the processes are failing.

ComReg should review existing processes to draw on the best practice aspects as input to new inter-operator processes. There is now a chance to draw up new processes mitigating problems from the past. This might be through bi-lateral discussions or through task-specific facilitation teams.

In this section we have identified three possible issues:

- Clearly defined processes for all stakeholders
- Criteria for SMP product withdrawal
- Continuity of existing wholesale products for a limited period.

2.3.1 Clearly defined processes for all stakeholders

There need to be clearly defined processes to cover the migration of current wholesale SMP products to an NGN environment. These processes will cover the requirements of all stakeholders and should ideally ensure that there is 100% equivalence of inputs for all migrated services, with timetables and referral procedures which eircom and all other stakeholders will follow during service migration, to ensure no disruption to wholesale customers and end users. This was raised as an issue by almost all the OAOs.

Whilst ComReg may prefer industry to review existing processes and establish new processes, ComReg should facilitate industry meetings to expedite these areas, by:

- reviewing existing SMP processes (WLR, CPS, LLU, leased lines, bitstream services) for effectiveness
- identifying new NGN product areas where processes may be needed
- reviewing changes required to database management (see below for further details)
- facilitating the creation of processes and timetables to maintain efficient investment and the continuation of a competitive environment. These processes will cover the interface requirements between eircom and OAOs that are needed to cover:
 - product definition, product ordering, delivery scheduling, fault reporting, fault resolution
 - high level rules for the management of the processes and the timescales for action / response to inputs
 - access to operational support systems to allow the automated access to data and billing information as appropriate
 - 100% equivalence of inputs for all eircom wholesale customers
- reviewing the developing NGN plans in Ireland to ensure appropriate action is taken in response to any changes which might affect the management of existing SMP products.

Reviewing changes required to database management

There are many areas in existing networks in which data held by one operator needs to be accessed by others; examples are non-geographic, geographic and mobile number portability. There are also databases which need to be held centrally for the benefit of all parties, e.g. directory enquiries.

As networks migrate to NGN, there will be additional requirements to define database interfaces and the associated management systems to allow integrated inter-operator processes, particularly in the areas of fulfilment and assurance, to allow clean ordering of services and management of faults in a multi service provider community.

There are different approaches to handling network/service databases, but there are common associated problems which need to be addressed, e.g. maintaining security, integrity, authentication, network traffic load and call latency, cost, etc.

The OAOs recognised a need to review the existing mechanisms for handling these databases in Ireland, and also the need to establish mechanisms for the management of

new areas which are emerging. The migration to NGNs in Ireland provides an opportunity to revisit the implementation of number portability and other databases, and, as shared databases become increasingly important, the options for the management of next generation number portability should be considered, whilst NGNs are being planned.

Database management issues, including access to other operators operational support systems, will become increasingly important in an NGN world.

We propose that *ComReg should work with the industry to: (a) draw up new inter-operator processes learning from the mistakes of the past, and (b) facilitate processes which enable new databases to be managed effectively in a competitive environment.*

2.3.2 Continuity of existing wholesale products for a limited period

One of the main concerns raised during discussions with stakeholders was the potential disruptions to their existing business models and services during a transition to NGNs. Similarly, eircom needs clarification regarding the interim period in which it will be expected to provide the current set of SMP products, given that with the move to NGNs other products may provide a better solution.

It is important to confirm that eircom is obliged to continue to fulfil its existing SMP obligations until ComReg removes these obligations either as a result of a market review or by some other means. While this may seem obvious to some stakeholders, confirming the requirement removes any doubt.

Continuity of SMP products is important to all stakeholders in the short term, however for eircom to make the most efficient use of its NGN (and for other current NGN stakeholders to take greatest advantage of networks other than their own), effective migration to next generation products will be important. The transition to next generation products should also benefit OAOs and consumers.

We believe that legacy SMP products and NGN products will run in parallel for a limited period of time. The time for parallel running will depend on the specific product, with some products migrating rapidly and other less so or not at all. For example, speedy migration to some new interconnect products may be of benefit to all stakeholders.

Notice period for discontinuation of legacy SMP products

All stakeholders need to understand ComReg's proposed approach to the discontinuation of legacy SMP products at a certain point in future.

Formal notification to OAOs by eircom would be needed prior to any discontinuation of an existing legacy SMP product. For clarification we are only referring to wholesale products which eircom is obliged to provide due to its SMP designation.

The notification of intention to withdraw a service depends on the service which is being withdrawn. In the UK there are regulated notice periods. For example as part of the review of the wholesale local access market BT is required "to notify new technical

information at least 90 days in advance of providing new wholesale services or amending existing technical terms and conditions to ensure that LLU operators are given sufficient time to prepare.” This requirement has since been removed as the NICC now has responsibility for industry consensus on technical developments.

In discussion with the Irish stakeholders OAOs suggested 18 months to 2 years notice would be required to take account of budget cycles and return on investments. Given the above discussion, we propose that as a policy principle, ***the minimum notice period for withdrawal of an SMP product or service should initially be set at 1 year (after the criteria have been met, see Section 2.3.3 below), but this suggested period should be tested by ComReg within the relevant industry working group or by consultation.***

2.3.3 Criteria for SMP product withdrawal

The decision to withdraw SMP obligations on SMP operators is the responsibility of ComReg, and would be taken after assessing the specific product market through a market review. However, as part of the bilateral discussions, we also asked all stakeholders their views on criteria for SMP product withdrawal. As a result we believe there are three main criteria which ComReg should put forward.

We propose that ***the burden of proof to justify the withdrawal of a legacy SMP product should lie with the SMP operator.*** The criteria where an SMP product withdrawal may be appropriate are:

- when there is no longer an adequate customer base to create reasonable demand for an existing product. In this case providing the service is uneconomic to the SMP operator and the request to provide the service becomes disproportionate
- if the SMP operator is found not to have SMP in a relevant market after a market review has been undertaken. It is possible that in future relevant markets are defined more broadly (this was mentioned by several OAOs as a possible outcome in future) and that the SMP operator is found to not have SMP in the more broadly defined market
- when it is reasonable (perhaps for economic or technical reasons) to move to an alternative next generation SMP product. In this case, if any of the following criteria are met:
 - The alternative service should be a suitable equivalent to that being withdrawn
 - The SMP operator will have held discussions (either bilateral or in an industry forum) with the parties affected to discuss and agree the product evolution options prior to withdrawal
 - The majority of end users have been migrated from the legacy product to the NGN SMP product and a clear timetable has been provided to any remaining users who have not yet migrated.

The above criteria should encourage the SMP operator to create and implement equivalent next generation SMP products in order to reduce the amount of time they spend offering two sets of SMP products. In eircom’s case it will also be important to make sure that as

customers transition to the new NGN product that OAOs do not bear increasing costs to support the smaller and smaller number of legacy customers.

Should any of the above criteria be met, ComReg should remove the obligation for eircom to provide the existing SMP product.

2.4 Interconnect issues

Interconnect between legacy networks and NGNs will be important during the transition to an NGN environment. Setting the best interconnect framework for the NGN environment will be very challenging and will require the participation of a wide variety of stakeholders.

Maintaining any-to-any connectivity for voice, and developing similar connectivity for other new services, will require inter-working arrangements and quality of service parameters. In addition, due to the nature of IP networking, different OAOs may require interconnect at different points in the network hierarchy.

In this section we examine three interconnect issues and provide our thoughts for policy principles.

2.4.1 Future interconnect charges

The agreement of points of interconnect and the setting of a reasonable price structure for future NGN interconnect services will be very important to facilitating migration from the PSTN to NGN. The locations of points of interconnect in the network hierarchy at which an OAO chooses to interconnect will depend on the prices for call origination and termination. In this section we look at the level of interconnect charges both during the transition to NGNs and in an NGN environment. In the next section we look at the importance of the location of points of interconnect and the nature of IP networking.

For competition to be efficient and effective, charges for eircom's interconnection services should be set at the level at which they would be set in a competitive market, which would reflect efficiently incurred costs. To date regulation of interconnection charges has generally been cost-based, and typically using the long run incremental cost (LRIC) standard. Most of eircom's interconnection services are charged on this basis, and the relevant cost data is provided to ComReg for its verification of the charges. However, as eircom transitions to the NGN environment a number of major changes in cost structures and levels may arise. For example:

- There may be changes on cost drivers and cost causality. In an NGN, for example, costs may no longer be driven primarily by call volumes in the busy hour.
- There may be a shift in the demarcation between access costs (which are not currently recovered through interconnection) and core network costs (which are).
- There may be fluctuations in unit costs as NGN investment leads to greater network efficiencies and traffic volumes change.

At this stage it is not yet possible to forecast exactly how these changes will impact on interconnect rates. The transition to a packet-based NGN will inevitably result in changes to the current set of costs and cost drivers which are based on existing circuit-switched legacy

networks. The extent and timing of these changes, however, is still relatively uncertain. This uncertainty can negatively impact on new entrants' incentive to invest in infrastructure as without visibility of future interconnect rates, operators are unable to properly evaluate the 'build vs buy' decision. For eircom too, continuing uncertainty about future interconnect rates can impact their business planning and the timing of their migration to an NGN platform.

As a means of reducing such uncertainty ComReg has signalled that it may be appropriate to set interconnect rates by reference to a wholesale price cap mechanism which would apply over the course of the period covered by the next interconnect market review⁵. A wholesale price cap applying for a predetermined future period could ensure that eircom complies with its obligation of cost-orientation, while simultaneously providing the desired certainty and stability to the interconnect market over the coming years. Such a mechanism, which would have the format of $CPI \pm X$, would have the merit of providing visibility of prices over an extended period and also of giving eircom an extra incentive in that it knows it can keep the benefits of over-achieving unit cost changes year-on-year.

Interconnect charges in a fully NGN environment

In a fully NGN environment the model for interconnect charging could potentially change quite radically although there is much debate about what the level and structure of charges might look like.

Indeed, in the UK Ofcom has also left this issue with NGNuk to discuss in the industry forum to find a commercial, industry-led solution.

A range of questions was raised during the bilateral meetings which could also be used as a starting point for further research into this issue. They included:

- Should charging for interconnect be service based? If so, which services should be included?
- If additional services are provided, would there be an additional charge?
- If the service is for example VOD, then would the charge be on a per session basis?
- To date there has been no charge for call control. Might this change in the future?
- What would be the implications for back office billing of per service billing?
- To alleviate the above complexity, would it be better to have a fixed charge per interconnect service or to pay for bandwidth and QoS rather than for the service carried?

Ultimately we propose that ***the charging structure for NGN interconnection should evolve with the lead taken by ComReg and drawing feedback in the relevant subgroup of the industry forum. The aim should be to have new arrangements in place which will allow a smooth transition from the current regime or a wholesale price cap if that proposal is taken forward.***

⁵ ComReg 07/02, Interconnection Market Review – Call Origination and Transit Services, Annex C.

2.4.2 The arrangement of points of interconnect

There are issues which need to be considered when the appropriate points of interconnect are determined in an NGN environment. It is a common principle to encourage competition at the deepest level in the network. This has driven regulators to set policy in two main areas:

- call origination and termination rates to encourage the deployment of voice switches and distributed points of voice interconnect

OAO voice network investment may be impacted by any changes to the incumbent's local and transit exchange network, with the risk of stranded assets for switches, ducts, fibre and other investment in PoI.

- local loop unbundling policy has encouraged OAOs to invest in systems, backhaul and marketing to provide competitive ADSL broadband services.

These assets are also at risk of being stranded, both from changes to the local exchange environment and also by the introduction of fibre in the local loop. In the latter case, if one or more OAOs require continued use of the local loop from the local exchange site MDF, should they bear the new full operations costs of running this network, or should the incumbent continue to bear costs?

If an incumbent network and alternate networks were being built using NGN principles from scratch, they would not face these problems. The problem is exacerbated by the fact that all OAOs have a different network footprint, and distribution of points of interconnect.

The nature of IP networking

The nature of IP networking coupled with varying speeds of NGN deployment means that different interconnect arrangements will suit different operators:

- At core network nodes: this could mean very few points of interconnect between NGNs. This may suit an OAO with its own access network (e.g. a cable network only operator) which might only require 3-4 PoI to transfer media traffic.
- At aggregation nodes: An OAO with multiple LLU sites and supporting backhaul infrastructure might require PoI at the aggregation nodes level as well as at the core network level.
- At the MSAN / DSLAM: it is possible for interconnect of media streams and control at the MSAN / DSLAM, with the OAO providing the service layer control of the incumbent's MSAN.
- At the application level: this will be a growing area for interconnection between network services and applications / data. As NGNs become established it is expected that significant competition should develop at the application level.
- At the operations level: NGN operational support systems will evolve and require information and data flows between operators. These are complex areas which have implications for network security and authentication.

2.4.3 Compensation for geographic rearrangement of points of interconnect

In Section 2.2.2 we discussed the issue of adequate notice for network migration and unbundled network access and in the section above we talk generally about requirements for points of interconnect in an NGN environment. In this section we look more specifically at compensation for migration of points of interconnect.

The geographic rearrangement of points of interconnect by eircom will have a cost impact on OAOs. The view of all OAOs is that, if the migration is forced, then eircom should pay the OAOs' consequent costs. A second aspect to consider is if an OAO has run fibre to a site, it could then have a stranded asset. However, if there was mutual benefit to both parties then the cost could be shared. Eircom felt that provided adequate notice was given prior to the move, then no compensation should be required.

There are a range of factors to be taken into account when deciding on whether and how much compensation is appropriate. They are:

- The extent to which eircom decides or forces migration without discussion with OAOs
- The benefits to be had by all parties as a result of the changes
- The length of time eircom has allowed to OAOs with regard to formal notification of changes to points of interconnect
- The remaining life of legacy interconnect equipment OAOs have in the site at the time of the change.

The possible policy principle we propose is that ***unless it provides adequate notice of its network migration plans (as discussed in Section 2.2.2) eircom should bear the cost of the impact on interconnecting OAOs, either by continuing to provide some equivalent form of interconnect at the affected locations or by offering appropriate compensation.*** Eircom and OAOs should resolve the above issue through commercial negotiation in the first instance. ComReg should only become involved if a dispute develops which cannot otherwise be settled between the parties.

2.4.4 Quality of service

The QoS parameters (for example latency, jitter and packet loss) for current wholesale services should be clearly defined in terms appropriate to the service.

Traffic handled within a single NGN or handled over multiple NGNs must have quality parameters defined which allow media traffic and control data to be routed between existing networks and NGNs such that the QoS parameters should not be worse than the equivalent QoS for services provided in a non-NGN environment. This also applies to existing services which are being emulated in the NGN environment.

With the NGN environment changing in Ireland, ComReg should:

- confirm the principle that ***at least the same (or equivalent) level of quality of service should be offered in an NGN environment as in the current PSTN environment*** so as to enable the same end to end services to customers. This does

not, however, preclude operators or service providers from offering service at other quality levels also.

- review the quality of service parameters for current services and the performance of operators in meeting these parameters
- place requirements on the industry to define and agree appropriate quality levels for new services and for existing services replicated in an NGN environment

At a consumer level, this is an issue which many operators felt would be resolved by virtue of market forces. ***Mechanisms for monitoring quality of service at the interconnect level should be agreed within the cross-industry NGN forum.***

2.5 Next Generation wholesale products with SMP

There is currently no clear understanding of what next generation products will look like. However, there are several possible issues and approaches which we discuss below. The objective of the discussions in this section is to set out first thoughts and begin to move these issues forward.

In this section we examine five issues:

- Potential next generation SMP products
- The concept of equality of access and equivalence
- Service bundling
- No retail service with out associated wholesale input
- Separation of call control from media stream.

We propose that ***ComReg should instigate industry debate on the regulation of next generation SMP products either through issuing a public consultation paper, or through discussion in the NGN industry forum.***

2.5.1 Potential next generation SMP products

As there has been no discussion to date about what future NGN SMP products will look like, we take a similar approach to Ofcom and make the assumption that the scope of future SMP products will be based on the extent of eircom's existing SMP products. eircom is likely to remain the dominant player with reference to scale and scope of its network for the next few years. Therefore where eircom currently has SMP in a market, it is also likely that any immediate successor to the same market will have SMP.

There are developments in the market which may influence the situation regarding SMP, e.g. the development of cable broadband and high capacity services provided by wireless and mobile operators. At present eircom has SMP in the markets listed below and it is anticipated that migration to NGNs will not change the picture in the short term:

- Wholesale unbundled access (local loops) - eircom supplies 100% of the market for unbundled metallic local loops⁶, SMP will remain in local access
- Wholesale broadband access (bitstream services) – SMP will remain in the next generation successor which could be a new eircom bitstream product such as the VDSL bitstream product
- Fixed narrowband wholesale exchange lines (wholesale line rental) – it is probable that whatever SMP product is the follow up to WLR, SMP will remain
- Call origination and local-tandem conveyance markets – SMP will remain at the point where narrowband voice interconnect takes place. Eircom has not mentioned what point this could be but it is potentially the Edge nodes or aggregation nodes.

If ComReg decided to mandate access to eircom's fibre network, what level in the network will best promote downstream competition? Options include sub-loop unbundling, access to new wholesale bitstream products, access to ducts and fibre. What would the appropriate service levels associated with these options? These issues should be discussed within the Industry Work Group proposed earlier.

2.5.2 The concept of equality of access and equivalence

In the UK, the concept of equivalence of input (EoI) and the requirement for BT to support "equality of access" is a core aspect to Ofcom's Telecom Strategic Review (TSR). Equivalence of Input for SMP products requires that BT make available the same SMP products and services to other providers as it makes to itself at the same price and using the same systems and processes. The principle set out in the TSR is that EoI should be enforced when the cost is proportionate and it should apply for all new wholesale SMP products, processes and systems.

We believe that the concept of equivalence of input would benefit the Irish market and the mechanisms to achieve this should be assessed.

2.5.3 Service bundling

We do not foresee any requirement to restrict the provision or pricing of service bundles in an NGN environment. However ComReg should continue to review eircom's product set to ensure that adequate margin exists between wholesale and retail services such that a margin squeeze cannot be created.

2.5.4 No retail service without associated wholesale SMP input

One of the stakeholders mentioned the potential situation which might arise where eircom launches a new retail product, such as ADSL2+, to their own customers, but does not have a wholesale service on offer in bitstream format at the same time. This would give eircom

⁶ "Market Analysis: Wholesale unbundled access (including shared access) to metallic loops and sub-loops," Consultation Paper, 11th Dec 2003, Document No. 03/146.

a competitive advantage while the other stakeholders wait (possibly for up to 6 months) for eircom to provide a wholesale equivalent.

The possible approach to this issue is that whenever eircom introduces a new retail product which is based on the provision of access in an SMP market, it would need to ensure that the SMP access product is made available to OAOs.

The product would also need to be available with enough time for OAOs to offer competing retail products at the same time as eircom. This approach would also need to apply to markets where eircom would most probably have SMP in the future. ComReg would have to consider which markets these could be.

2.5.5 Separation of call control from media stream

In an NGN environment the call and service control elements are separate from the media stream (voice, video, etc.) transport. As NGNs evolve, it may be possible for these services to be provided separately by eircom with separate charging for control and media streams. The availability of separate charges and the level of charges will have a significant impact on the investment decisions which might be taken by OAOs.

2.6 Consumer protection

The introduction of NGNs should provide significant benefits to consumers, and regulation should be looking to maximise consumer welfare where possible. While it is not currently clear what new services will be offered over NGNs, it is expected that current voice and data services will continue, with the expectation of increased variety in types of services on offer and price points. However, given the complexity of the transition to NGNs, protection of consumers is very important, both during the migration period and at completion of the process.

During our discussions with stakeholders we identified three critical issues for consumers:

- The quality of service which is provided to the consumer must be maintained during the migration period with no break in service regardless of the network over which the traffic is carried
- All current mandatory services such as access to emergency services and number portability must be maintained during the transition and in the NGN environment.
- Communication with customers and maintaining transparency of tariffs and prices will be important as tariffing grows in complexity in the NGN environment. There were mixed views as to the role of ComReg in making sure that the transition is smooth and any impact is explained to customers. Some OAOs felt it was their own responsibility to inform their customers of changes (and indeed this has taken place successfully in the past) while others felt a co-regulatory model and industry forum would be of benefit.

There may be other issues which crop up before or during the migration and which need to be addressed on a cross-industry basis. In the UK the role of identifying and addressing consumer protection issues and other wide ranging issues arising from the move to NGNs

sits with NGNuk. We have noted in Section 2.1.2 the possible need for a sub forum to be formed with reference to consumer protection and communications issues.

A second point to be noted, based on the critical issues identified, is that eircom mentioned it intended to provide emulation of PSTN services. In such a circumstance some of the issues raised, including access to emergency services, may not prove a problem.

As a result of the above findings we think that ComReg should consider the following policy points:

- The quality of services and range of services provided to consumers during the migration to NGNs should be equal to their existing basic voice service. See also Quality of Service in Section 2.4.3. This would include all current mandatory services such as access to emergency services, number portability etc. In addition the advent of NGNs may lead to new and improved ways to offer services to certain groups such as the disabled.
- The consumer must be made aware of any changes to their existing service. There should be an agreed notification period of intention to withdraw any service, which may vary depending on the service being withdrawn. Guidelines for notification period and the mechanisms to be used need to be established.

As a policy principle we propose that ***consumers should not unwillingly or unknowingly experience a degradation in service quality as a result of migration to NGNs.***

3. Key issues in the Irish market

In addition to the proposed policy principles outlined in this paper, a number of key issues related to NGN introduction are summarised. They are structured by posing questions which need to be considered by the National Advisory Forum or by the Industry Forum Steering Group, in two areas:

- issues related to the development of infrastructure and competition in Ireland. These may be issues for consideration by the proposed National Advisory Forum.
- issues regarding wholesale products in an NGN environment and the impact on services, which may be considered by the proposed Industry Forum Steering Group.

Infrastructure development and competition

1. How will the new 'digital divide' be addressed in Ireland? The historic situation whereby some lines had access to broadband service and some did not is now being overcome as the deployment of DSLAMs in rural and small exchanges progresses, complemented by initiatives to bring broadband to all potential users. However, some consumers will have access to increasingly high broadband and associated media services, while some will be restricted by issues of loop length, access technology or service availability to low capacity broadband (<1Mbps) or none at all. The new digital divide will be between those with access services operating at 10Mbps or more and those without such access.
2. Mindful of the above, what are the appropriate incentives to encourage the development of next generation access (NGA) networks beyond the level of investment determined by the risk/ reward profile of a the business plan. What is the correct balance between competitive supply, market demand, regulatory policy and government intervention?
3. Will there be economic / network bottlenecks to deploying competitive access infrastructure? The issue of economic bottlenecks is still relevant for some areas of Ireland, particularly backhaul from access networks to an operators core network. The scope of the problem needs to be understood in order that appropriate policies can be established.
4. What is the sound economic approach for geographic broadband coverage: population density, social policy, demand for services? Competitive providers will of course be driven by consumer demand and there are many initiatives to stimulate broadband availability and encourage demand. In light of the opportunities provided by NGN development and the changing availability of access, the Advisory Forum needs to assess the regulatory and commercial direction required to meet government policy.
5. The development of next generation access (NGA) will impact the development of new, infrastructure-based competition. The National Advisory Forum may need to consider the impact of NGA on LLU, investment in infrastructure (ducts, fibre, etc) and the impact on the principle of promoting infrastructure competition at the lowest possible level in the network (where the greatest economic value can be added).

Wholesale products in an NGN environment and the impact on services

The impact of the introduction of NGN and NGA in Ireland on infrastructure-based competition needs to be assessed, as do the regulatory remedies that might be appropriate to encourage a desired level of network and access competition which will best meet the needs of the Irish economy and the industry. ComReg should consider possible policy principles for NGA in more detail than described in this paper when the industry's plans are more clearly understood and when they have been reviewed in the Industry Forum.

The introduction of NGNs will change the balance of competition between operators and it is important that effective competition is promoted during the transition to NGN.

Many of the wholesale products introduced initially in an NGN environment will be to allow voice, broadband and other access services similar to those offered on pre-NGN networks. For the longer term, there is no clear understanding of what future next generation products will look like. Focussing on the shorter term, there are several possible issues and approaches which we discuss below. Wholesale products will need to be defined for the deployment of the eircom core NGN and the next generation access network also.

New wholesale broadband access and bit stream products / services will need to have flexibility to meet rapidly changing needs for service and media delivery. The new products and services should have associated definitions, contractual terms and processes defined in parallel with the preparation of the product definition. It should be an objective that new wholesale NGN products are defined with associated fulfilment, assurance and billing processes which can be managed through a single simple interface using straightforward processes.

The Industry Forum will be the appropriate place to make decisions and address the following questions:

1. What type of new wholesale products and services will be needed in the short / medium term:
 - the equivalent of WLR PSTN voice services, but allowing the OAOs to differentiate their end-user voice service features and have more control of call termination to the called party?
 - broadband service-based products in which the delay, jitter, packet loss and bandwidth characteristics are specified to suit different media and service applications?
 - do wholesale broadband services need to provide variable bandwidth? Are flexible product configurations required which can be adjusted to meet variable market demand, e.g. high demand for TV / video service for sporting or other major events? What level of flexibility within a given committed bandwidth is needed?
 - how do these product requirements change between the copper access network and fibre access network?
2. How does the introduction of fibre in the local loop impact existing service offerings, and what additional products will be needed? Will the industry require leased access products to fibre, ducts and poles in the access network? If products in these areas are

- provided, then the interests of the asset owner for physical protection of the asset have to be taken into account, as do the needs of the operator leasing the asset. What rules should apply for shared / leased access infrastructure, e.g. for physical access, installation and maintenance of fibre in leased ducts? The forum may wish to consider whether composite service bundles are required, e.g. to include installation and maintenance of fibre in ducts.
3. How should the industry make the transition to NGN whilst still protecting the interests of the consumer? The ways in which end-users might be impacted need to be considered, e.g. continuity of services, service level agreements, service characteristics. Plans to minimise the impact on end-users and communicate the changes will be needed across the industry.
 4. How will infrastructure competition impact the development of these wholesale next generation network and access products? Although it is an objective of ComReg to encourage infrastructure investment at the lowest possible level in the network, there may be only very limited competitive fibre access build. Is the proposed principle of equivalence, whereby the retail divisions of eircom have access to the same eircom wholesale products and services as OAOs, appropriate in Ireland and how should this be established?