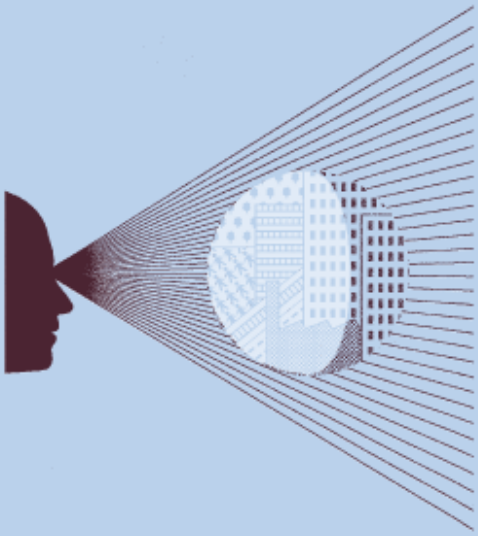
Oxera

eircom's next-generation access products

Pricing principles and methodologies

Prepared for Commission for Communications Regulation

April 2012



Oxera Consulting Ltd is registered in England No. 2589629 and in Belgium No. 0883.432.547. Registered offices at Park Central, 40/41 Park End Street, Oxford, OX1 1JD, UK, and Stephanie Square Centre, Avenue Louise 65, Box 11, 1050 Brussels, Belgium. Although every effort has been made to ensure the accuracy of the material and the integrity of the analysis presented herein, the Company accepts no liability for any actions taken on the basis of its contents.

Oxera Consulting Ltd is not licensed in the conduct of investment business as defined in the Financial Services and Markets Act 2000. Anyone considering a specific investment should consult their own broker or other investment adviser. The Company accepts no liability for any specific investment decision, which must be at the investor's own risk.

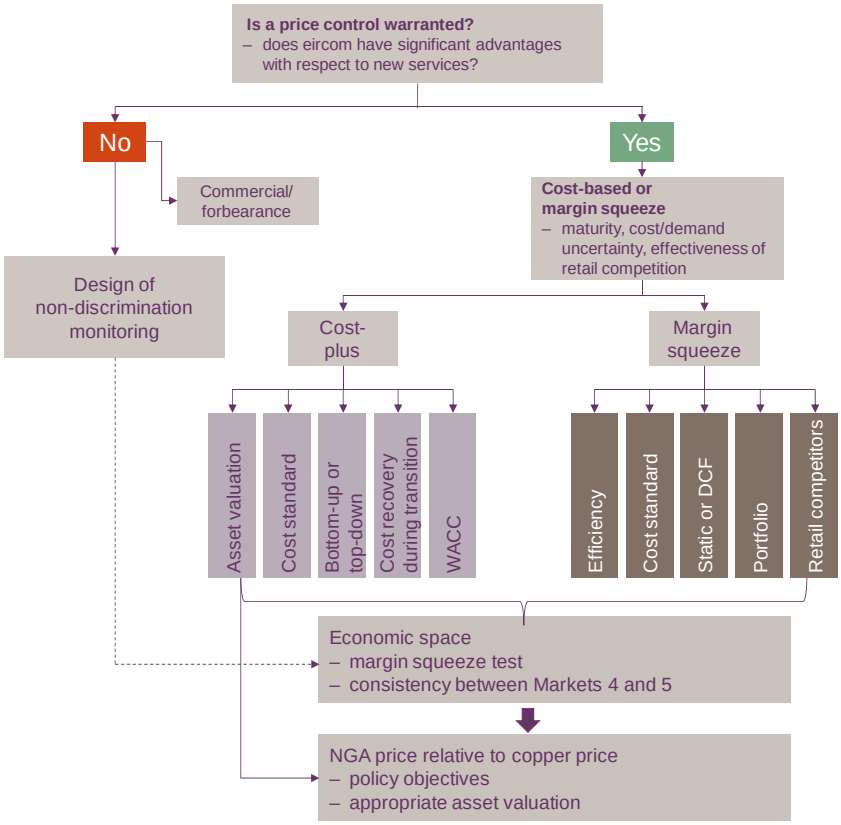
© Oxera, 2012. All rights reserved. Except for the quotation of short passages for the purposes of criticism or review, no part may be used or reproduced without permission.

Executive summary

In July 2011 eircom announced that it would deploy a next-generation access (NGA) network infrastructure and upgrade fixed-line broadband speeds in Ireland. Its plan in phase 1 of the roll-out is to pass 100,000 homes by mid-2012, with approximately 1m premises passed in a few years' time. eircom's NGA network will be predominantly fibre-to-the-cabinet (FTTC) complemented by fibre-to-the-home (FTTH) in selected areas. ComReg is reviewing whether NGA could have implications for the rationale for, and specific form of, price regulation in the markets of local access and wholesale broadband access, and, if so, what these would be. Regulatory remedies imposed on the relevant markets of wholesale physical network infrastructure access (WPNIA) and wholesale broadband access (WBA) (Markets 4 and 5 respectively) influence the competitive landscape in Ireland, both in terms of eircom's incentives to proceed with its plans to deploy next-generation broadband, and with respect to the ability of the other alternative operators (OAOs) to access the necessary, potentially non-replicable, infrastructure in order for them to remain and extend their influence in these markets.

The objective of this report is to assess whether the NGA products warrant regulatory pricing obligations similar to those imposed on legacy access inputs, and, where price regulation is considered appropriate, to assist ComReg in designing these remedies such that they are commensurate with any competition problems identified. Furthermore, the report aims to provide ComReg with a time-consistent framework to introduce appropriate remedies now, and, if there are changes in market circumstances or in the risk profile of NGA networks and services, to adjust the remedies appropriately going forward. The framework is illustrated below.

Stages in assessing the need for and form of price regulation



Source: Oxera.

Margin squeeze test as the appropriate form of price control

On the basis of historical evidence and Oxera's assessment of various potential rationales to provide wholesale access to third-parties, it appears that eircom is unlikely to have sufficient incentives to provide appropriate—fair and non-discriminatory—access on a voluntary basis. Even if access were provided, there are credible concerns that commercially determined access pricing would not be consistent with ComReg's objectives, or even competition law. In order to provide OAOs with sufficient certainty over the entry conditions, an ex ante price regulation seems warranted.

The design of the appropriate form of price controls needs to recognise that the planned NGA footprint is mostly (but not entirely) equal to the UPC cable footprint. In these areas, eircom faces a retail pricing constraint from UPC, which is already providing high-speed services coupled with the retail-level pricing constraint from OAOs that have unbundled eircom's exchanges. Indeed, eircom's investments in NGA can be considered, to some extent, defensive. As a consequence, there are few concerns that the retail prices of these services would be excessive. However, the incentive to provide competitive wholesale services to third-party access seekers on commercial terms appears to be weak. Under such circumstances, cost-plus regulation is unlikely to be meaningful, given the conceptual and practical difficulties associated with asset valuation of networks that are, to some extent, subject to a competitive constraint in the retail market.

As appropriate access prices are necessary (despite the *retail* pricing constraint), it is essential to ensure a sufficient margin between retail and wholesale prices, and between the various wholesale inputs. Hence, rather than a stringent cost-based pricing obligation, a margin squeeze-based control would seem more appropriate for the next price control period. This approach also allows efficient retail (and wholesale) price discrimination, which may be necessary for new services with a degree of demand uncertainty.

Consistency of regulation across access products

The margin squeeze test should be designed to ensure consistency across the supply chain, and between legacy and NGA products and inputs. As identified in ComReg's market definition, legacy products are close substitutes with NGA products at the retail level, and both are supplied largely on common network inputs—in particular, the copper connection between a street cabinet and an end-user. As a result, the current bottom-up, long-run incremental cost (BU-LRAIC plus) ceilings for access charges for local loop unbundling (LLU) and sub-loop unbundling (SLU) may need to be adjusted downwards, should the margin squeeze test render such a revision necessary.

An important message of this report is that conventional regulatory costing approaches (valuation of regulated assets at historical or replacement cost) are of limited relevance where retail prices are constrained by competition. To the extent that customers do indeed switch to UPC, the economic value of sunk copper assets in UPC areas is, conceptually, the residual of revenue (which is constrained by UPC) less operational costs and other non-sunk costs. Consequently, there seems to be limited economic rationale to consider that the current LLU and SLU (maximum) prices constitute cost-based price floors below which eircom cannot reduce its other tariffs, taking into account other relevant costs.

While the rationale to prevent a margin squeeze between retail and wholesale charges is perhaps more apparent, the concept of economic space between wholesale inputs builds on a slightly different economic underpinning. In particular, insufficient headroom between, say NGA-based bitstream and virtual unbundling, could not only foreclose an OAO, but also impede the development of facilities-based competition, to the long-term detriment of competition in the market in Ireland. Hence, consistent with ComReg's approach thus far to 'legacy' wholesale access products, a sufficient economic space seems needed between

different layers of wholesale NGA products—ie, between white label and bitstream services, and between bitstream access and physical or virtual unbundling.

In the context of NGA roll-out, the notion of economic space can be extended to include the economic space between LLU and virtual unbundled access (VUA), even though LLU is not a direct input into VUA:

– first, SLU is a common input into both access products, so a consistency requirement between SLU and LLU, on the one hand, and SLU and VUA, on the other, indirectly implies a consistency requirement between LLU and VUA;

– second, efficient migration from copper to next-generation broadband can be ensured with the right price signals for OAOs and final consumers. In principle, this requires LLU and VUA prices to be consistent with the quality and other aspects of these products.

Therefore, the imposition of an ex ante margin squeeze test for NGA services, as proposed by Oxera, could have implications for the pricing of certain legacy inputs, namely LLU and SLU.

Oxera's conclusions on the assumptions of margin squeeze test

The assumptions underlying the margin squeeze test should be in line with ComReg's objectives to ensure sustainable competition, while recognising that the OAOs should be given the right incentives to achieve economies of scale and scope. Put another way, a too stringent test would uplift the margin/economic space, which carries the risk of pushing either the wholesale price too low or the retail price to a level that is not competitive. The specific assumptions recommended by Oxera are summarised in the table below.

Pricing assumptions (margin squeeze test, active NGA services)

	Recommended approach	Underlying assumptions
Assumption on efficiency	Similarly efficient operator, but equally efficient operator as soon as entrants have gained scale, or potentially a glidepath	Consistency across different layers of the supply chain Approach consistent with legacy Wholesale Broadband Access (25% market share assumption)
Level of aggregation	Portfolio	Efficient price discrimination allowed for ranges of broadband speeds
Costs	Forward-looking long-run average incremental cost (LRAIC+); average total costs for the portfolio	Consistency across different layers of the supply chain Entrants expected to enjoy some economies of scope as they are active in a number of adjacent retail markets. To the extent that eircom benefits from significant economies of scope that are not available to OAOs, an appropriate mark-up for common costs could be included or ATC considered
Period-by-period or forward-looking	Forward-looking	Test based on monthly prices and costs (fixed upfront costs converted into monthly costs over average customer lifetime) Assessment of cash flows over time in a discounted cash flow (DCF) framework may be necessary because of the uncertainties associated with NGA upfront costs (eg, new equipment and installation); and risk-sharing pricing structures involving high upfront fees relative to recurring monthly charges
Voice service (bundles)	WLR	No evidence of significant offerings of VoIP that meets the quality standards of, and could be considered as a substitute for, legacy-level voice services

Source: Oxera.

To ensure that prices are indeed cost-reflective and not below relevant costs, ComReg could use the cost-plus approach as a cross-check (this approach has been employed by Ofcom, for example). Furthermore, the test should apply in all geographic areas where NGA networks are deployed.

Recognition of policy objectives and consistency over time

Notwithstanding the above conceptual reasoning, the appropriate pricing framework needs to be tailored to achieve ComReg's objectives, which, Oxera understands, are:

– orderly migration to fibre-based services;

– cost minimisation (avoiding possible costs of dual-running);

– competition at the deepest level of the network to the extent economically feasible and maximum scope for product differentiation.

The regulatory approach adopted by ComReg therefore needs to recognise the inherent trade-offs between these objectives. It would seem to be in the interest of all stakeholders to migrate to a single high-speed platform as soon as possible if (and only if) it can be guaranteed that the migration process would not unnecessarily distort OAOs' operations; and the wholesale products available post-NGA roll-out are those that deliver the most economically efficient outcomes in terms of accessibility, technical capability and scope for differentiation. It is Oxera's understanding that eircom will retail its legacy network at least in the medium term.

The relationship between the prices of NGA and of copper access products presented above may imply that copper prices decrease as a result of pricing of NGA at the retail level. The prices of NGA products *relative to* copper-based access play an important role in providing the industry (both eircom and the OAOs) with incentives to stay on the copper platform (and continue using products such as LLU and bitstream) or to migrate to NGA.

Provided that the pricing and accessibility of NGA products are appropriate and allow enough innovation at the retail level, it would be efficient to migrate all operators in an orderly fashion to a single, next-generation, platform. This would avoid any additional costs of dual-running (even if these costs are small), and is consistent with the objective of enhancing the take-up of advanced services. However, it would be in line with ComReg's previous policy decisions and regulatory determinations to allow a sufficient transition period over which the OAOs have enough payback time for their existing investments, and over which the NGA products become tried-and-tested in terms of both technical features as well as pricing structures (possibly over the next three to five years).

These recommendations build on a review of what adjustments are required to the existing price regulation to allow eircom sufficient pricing flexibility to remain competitive where it faces competition from UPC, while still providing OAOs with opportunities to enter the retail market through the purchase of eircom's wholesale products. Although the specific assumptions of the margin squeeze test may change over time, any such changes should follow pre-specified transparent criteria, as set out in this report.

Contents

List of tables

List of figures

List of boxes

1 Introduction

ComReg is seeking to review whether the ongoing roll-out of next-generation access (NGA) could have implications for the rationale for, and specific form of, price regulation in Markets 4 and 5, and, if so, how. Regulatory remedies imposed on Markets 4 and 5 influence the competitive landscape in Ireland, both in terms of eircom's incentives to proceed with its plans to deploy next-generation broadband, and with respect to the ability of the other alternative operators (OAOs) to access the necessary, potentially non-replicable, infrastructure in order for them to remain in these markets.

The objective of this report is to assess whether the NGA products warrant regulatory remedies similar to those imposed on legacy access inputs, and, where price regulation is considered appropriate, to assist ComReg in designing these remedies such that they are commensurate with any competition problems identified, or. Furthermore, this report provides ComReg with a time-consistent framework to introduce appropriate remedies now, and, if there are changes in market circumstances or the risk profile of NGA networks and services, to adjust the remedies correctly going forward.

1.1 eircom's NGA network and relevant products

Prior to setting out the framework for assessing the rationale for, and implementation of, remedies for NGAs, it is helpful to review the principal characteristics of eircom's network roll-out, the main services provided over NGA networks, and the competitive constraints relevant to both retail and wholesale markets where eircom has invested, or will invest, in NGA.

1.1.1 NGA deployment in Ireland

In July 2011 eircom announced that it would invest €100m to deploy an NGA network infrastructure and upgrade fixed-line broadband speeds in Ireland. Phase 1 of the roll-out plans to pass 100,000 homes by mid-2012. Phase 2 roll-out includes a further 12 exchanges passing an additional 125,000 premises, with approximately 1m premises passed in several years' time. The geographical scope of the deployment is limited to specific areas based on the network build costs, subscriber density and the level of competition in the retail broadband market from alternative platforms. In general, the footprint within which eircom is currently proposing to roll out NGA networks coincides largely with that of UPC, the cable TV operator.[1] In these areas, because of the technology now employed by UPC, most, if not all, of the retail products that eircom will provide over the NGA network will face competition from alternative products available from UPC. UPC is currently not subject to ex ante regulation in relation to these retail products, and is not under any obligation to supply any wholesale products to third parties with respect to these products.

As a result, four area types can be identified with different structural characteristics, and where the economics of NGA *may* differ. As a result, these area types *may* require specific adjustments to the design of the appropriate remedies:

– eircom has an NGA network, and UPC has a cable TV network, providing a level of infrastructure-based competition at the retail level;

– eircom has no NGA network, and there is no cable TV network. Any broadband products will be delivered in these areas using existing copper networks;

[1] An exception to this is eircom's NGA roll-out to the town of Letterkenny, which currently has no UPC coverage.

– eircom has an NGA network, and there is no cable TV network. There is unlikely to be significant infrastructure-based competition at the retail level;

– eircom does not have an NGA network, but there is a cable TV network capable of delivering NGA-type services.

For the purpose of this analysis, only the first two outcomes are considered in detail. Oxera understands that the third outcome is a possibility in parts of the phase 1 plan (ie, the deployment to Letterkenny) or in the event of a subsequent NGA expansion. While not the subject of immediate focus, this type of outcome is relevant from the perspective of addressing transitional arrangements with respect to local-loop unbundling (LLU) and legacy products and the interaction with NGA pricing. The fourth type of outcome describes the current situation with UPC's footprint. Oxera understands that this outcome will become increasingly irrelevant as the eircom network is rolled out. The network topology for eircom's investment is predominately fibre to the cabinet (FTTC), with some areas receiving fibre to the home (FTTH) based on gigabit passive optical network (GPON) technology. With FTTC, eircom will deploy new fibre-optic cables from its exchanges to street cabinets. Additional active cabinets in the streets will house the copper-oriented digital subscriber line (DSL) equipment, similar to that currently deployed in exchanges. eircom is deploying an enhanced specification of DSL (VDSL2), which seeks to exploit shorter local-loop distances to increase broadband speeds above current generation technology. eircom will retain the exchange-side copper connections, so there will not be a copper switch-off subsequent to this network roll-out.

The FTTH topology being deployed by eircom is based on a shared-access medium with passive optical splitters that aggregate multiple household fibre connections into one strand connecting to centrally located line-terminating equipment. Optical line equipment in the exchange broadcasts the encoded downstream data, which physically reaches a group of up to 64 subscribers. Using time division multiplexing (TDM), each subscriber network termination unit within the group waits in turn to transmit its upstream data. eircom proposes two possible bandwidth configurations for the FTTC deployment, one aimed at high-speed users (up to 50Mbps downstream, 20Mbps upstream) and the other at real-time sensitive applications such as IPTV (up to 35Mbps downstream, 16Mbps upstream). The FTTH deployment will support 100Mbps downstream and 30Mbps upstream. Both topologies will be able to support multicast traffic, in principle allowing access seekers to provide IPTV and streaming services.

1.1.2 Relevant wholesale products in NGA environment

In the context of NGA networks, the relevant products are the wholesale physical network infrastructure access (WPNIA) products within Market 4, and the active access products in Market 5 (WBA).

More specifically, Market 4 will encompass the following products.

– **Local-loop unbundling** (LLU) and **shared access**. In an FTTC environment, LLU is not relevant in terms of gaining access to high-speed VDSL2-based products. LLU over the existing copper network will remain as a wholesale product nationwide. This might be relevant for lines within an NGA-enabled exchange that are too long for NGA products.

– **Sub-loop unbundling** (SLU). This will require access seekers to take physical control of the copper line from the distribution point to the customer premises. Typically, the access seekers will need to deploy their own street cabinets and backhaul network. Oxera recognises that eircom is currently obliged to provide SLU and that this obligation is potentially incompatible with the eircom NGA roll-out due to the technology roadmap for VDSL implementation. Future speed improvements may rely on a cross-talk reduction technique called 'vectoring', which would require physical control over all lines within a cabinet. While this constraint does not fully preclude SLU, it may require an entrant to take control of an entire distribution cable (ie, cabinet) to exploit in full the

cross-talk signal improvements. eircom has indicated that SLU will still be available in a non-NGA area if vectoring precludes its use within the footprint. Oxera understands that vectoring standards[2] and hardware have been developed and trials undertaken; however, deployment of these standards of SLU is still limited.

– **Duct access**. As a wholesale product, duct access will require access seekers to provide fibre to the street cabinet or end-customer premises using eircom's duct network. Distribution points, backhaul and core connectivity are provided by the access seeker. At present, pricing for duct access is based on commercial negotiations, although duct costs are embedded in copper access prices (ie, duct costs for part of the bottom-up long run incremental cost (BU-LRAIC plus) model applied in the context of LLU pricing).

– **Fibre unbundling**. Physical fibre unbundling would allow an access seeker to take physical control of a fibre segment into the customer premises, possibly from an eircom central office or exchange. eircom has indicated that it may develop an unbundled fibre product in the future, although it is envisaged that the footprint of point-to-point fibre networks will be relatively limited. Oxera understands that eircom's proposed pricing for this product will be based on commercial negotiations. The planned GPON NGA deployment (which is a shared fibre medium) will presumably need to provide sufficient fibre capacity[3] to enable this.

Variants of the following wholesale products will be provided as part of Market 5.

– **Legacy bitstream**. eircom currently offers Layer 2/Layer 3 encapsulated wholesale bitstream products covering speeds of 1–24Mbps downstream and 128kbps–2Mbps upstream. The product is based on eircom's footprint of ADSL and ADSL2+ enabled exchanges. This product is currently subject to ex ante regulation and margin squeeze test price controls, and the expectation is that it will be offered alongside NGA products.

– **NGA Bitstream**. This managed product uses eircom's next-generation core network to provide 'uncontested' backhaul to the entrant. OAOs are able to specify their own contention ratios on their Layer 2 aggregation point devices, thereby giving more control over the service specification. This contrasts with legacy bitstream services (see above), where congestion avoidance rules are implemented by the incumbent in the backhaul component of the network. Charges for this product include port and data usage components. This Layer 2-only product will allow some level of control over authentication and traffic management via class of service (CoS) tagging. It is expected that this will have typical bitstream pricing characteristics. Access speeds will be 50Mbps/30Mbps (high speed) and 35Mbps/16Mbps (IPTV) for FTTC and 150Mbps/30Mbps for FTTH.

– **Virtual unbundled access (VUA)**. The intention is that this Layer 2, Ethernet-based bitstream product will replicate the economics of LLU in the NGA environment. eircom is proposing to have a pricing plan with considerable upfront charges alongside the monthly port access and ancillary service charges. This plan will be offered alongside a standard VUA price scheme primarily constituting per-line variable charges. Access seekers will have the option to interconnect with eircom at the local exchange using their own backhaul. The service specification is supposed to allow an increased degree of control, via Layer 2 CoS prioritisation. Access seekers will also provide their own authentication, authorisation and accounting. Telephony unbundling will be via a legacy

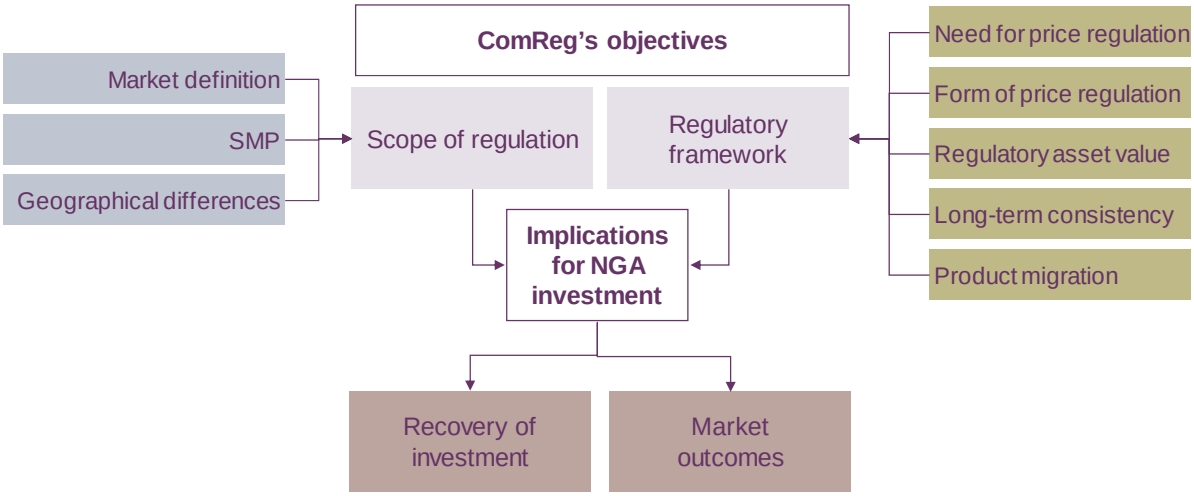
[2] ITU-T G.993.5 is the recommendation that describes the VDSL2 transmission coordination scheme to reduce cross-talk and improve throughput.
[3] The location of the splitters in the distribution network will have a direct effect on the number of fibres required to feed into the aggregation point in a GPON environment.

POTS interconnection at the local exchange. Access speeds will be the same as NGA Bitstream.[4]

1.2 Market framework for NGA investment

In the context of NGA, the main regulatory challenge is to incentivise economically efficient investments, while considering the right approach in regulating networks where eircom possesses significant market power (SMP). A number of aspects of the future regulatory regime will have significant implications for the value of NGA investments for eircom, the value of some of the existing assets owned by eircom and its decision to invest. As shown in Figure 1.1, these fall into two broad categories: the scope of regulation and the regulatory framework.

Figure 1.1 Generic aspects of regulatory regime for NGA



Source: Oxera.

The decisions on market definition and SMP status will determine which services/products may be subject to price regulation, and, where price controls are applied, the precise set of assets over which the price controls are applied. In the context of this report, Oxera takes ComReg's current SMP decisions and market definitions as given. With regard to the design of remedies, several regulatory parameters need to be taken into account when assessing the appropriateness and form of regulation in Markets 4 and 5.

– **ComReg's regulatory objectives**. Any recommended approach for NGA price regulation needs to take into account ComReg's regulatory objectives—specifically, the promotion of competition, contribution to the development of the internal market, and the promotion of the interests of users within the community. As discussed in this report, the design of pricing principles necessitates an understanding of ComReg's objectives with respect to, for example, the promotion of facilities-based competition and the speed of migration to NGA.

– **Geographical differences**. FTTx exhibits different economies of density to traditional PSTN/DSL, and competitive conditions across geographical areas are likely to differ in the NGA environment. As a result, even if the geographical markets defined in ComReg's SMP decisions are national in scope, there may be a case for designing

[4] It is Oxera's understanding that VUA could be treated as part of Market 5. This is because, as noted above and as explained further is section 4, VUA is an active access product (an enhanced bitstream). While the point of handover and pricing structure may be different from traditional bitstream offers, the economic and technical characteristics are different from physical unbundling.

remedies that can reflect the possibly different degrees of competition and network deployment in different areas.

– **Remedies commensurate with competition problems identified**. Even if SMP were identified (as it is currently), the remedies could be tailored to reflect the levels of competition in the market. There are precedents of allowing pricing flexibility with regard to NGA products.[5] In particular, the design of remedies should take into account potential retail pricing constraints and the replicability of network assets.

– **Regulatory consistency over time**. In principle, price regulation, whether cost-plus-based or via a margin squeeze test, should not stop the investing operator (eircom) recovering its costs and earning returns equal to the lifetime cost of capital of its assets, if that is possible within the competitive market. Any perception that there are likely to be changes in the regulatory regime midway through the lifetime of an investment would be likely to distort the ex ante investment incentives of eircom and the OAOs.

– **Product migration**. First, it is ComReg's objective to ensure consistency in regulatory remedies across wholesale products in order to enable a functioning ladder of investment. Second, it is in consumers' interest that a swift migration from legacy services to NGA is ensured, and that entrants have both the incentives and the ability to migrate with lowest possible costs.

– **Relationship between regulation of legacy services and fibre access**. As manifested through the proposals put forward by the European Commission, the way in which fibre access products are priced relative to legacy inputs influences the OAOs' incentives to migrate from existing services to services using NGA inputs, and the incumbent's incentives to invest in new (NGA) assets and services in the first place.

– **Phasing of the investment**. There may be value in phasing the roll-out of NGAs because additional information on the commercial and market environment may become available over time, which would allow the investment strategy to be optimised (the valuable 'wait and see' option). Therefore, potential consumer benefits of promoting more immediate investments should be compared with encouraging a more 'patient' approach.

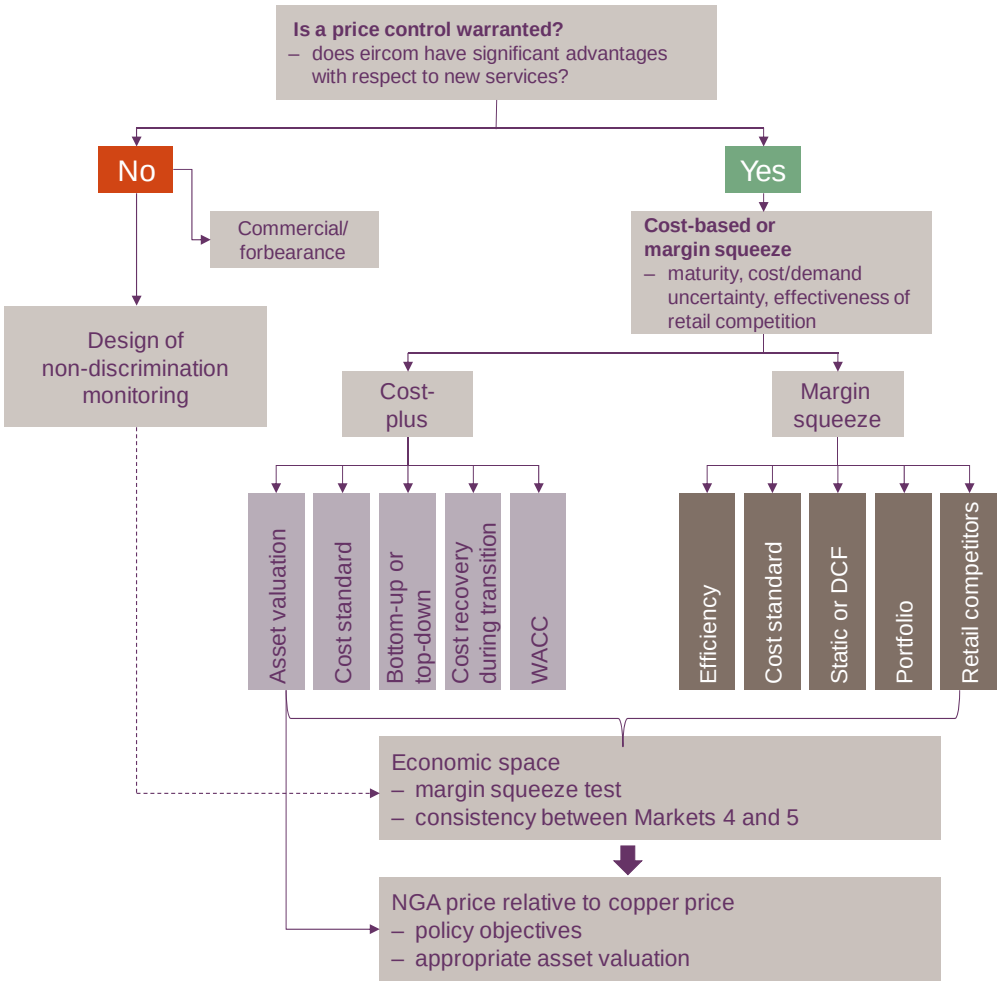
The above regulatory and commercial issues will have a significant impact on the overall attractiveness to eircom of the NGA investment, and need to be taken into account when determining the regulatory regime. Related factors may also be relevant should ComReg be called upon to provide advice to the Irish government in the context of the proposed National Broadband Plan, and the funding of NGA roll-out across Ireland.

1.3 Stages of analysis and report structure

The overarching framework for the assessment of appropriate price controls for NGAs is illustrated in Figure 1.2 below.

[5] Ofcom (2010), 'Review of the wholesale local access market – Statement on market definition, market power determinations and remedies', October 7th.

Figure 1.2 Analytical stages of price control design



Source: Oxera.

The remainder of the report is structured according to the above framework, as follows.

– Section 2 assesses the appropriateness of price controls. First, the circumstances under which price regulation would not be required are considered, followed by application of these criteria in the Irish context (over the transition period, possibly the next three to five years).

– Section 3 presents a conceptual assessment of the approaches to price regulation in the context of NGAs. There are three key parts to this assessment.

  – Margin squeeze test or cost-plus—as discussed in further detail below, the assessment of the form of price control involves specifying the conditions under which a margin squeeze test and/or cost-plus regulation could be considered. The choice between these two forms of regulation depends on a variety of factors, including the trade-off between providing sufficient flexibility to permit cost recovery under cost and demand uncertainty, as well as setting access prices that allow competition with alternative platforms where these are available.

  – Specific assumptions of price controls imposed—in the context of cost-plus regulation, assumptions are made on asset valuation, eircom's cost of capital and cost standard; in the context of margin squeeze test regulation, similar considerations are warranted—for example, on the assumptions about entrants' efficiency, the retail cost base, and whether the margin squeeze test control is

determined on a forward-looking (discounted cash flow, DCF) basis, or some other basis.

  - Ensuring consistency across wholesale products—regardless of the approach taken, it would seem necessary to ensure that regulatory remedies imposed on the two markets (Markets 4 and 5) are consistent with market reality and that there is sufficient economic space between the prices of different wholesale inputs to allow (efficient) OAOs to compete effectively in the retail market using eircom's wholesale products as inputs. Furthermore, and again irrespective of the approach, measures to prevent margin squeeze between wholesale and retail prices could be determined ex ante.

- Section 4 discusses the types of product provided over eircom's NGA networks and the associated regulatory considerations.

- The interplay between copper and fibre prices is discussed in section 5. Copper- and fibre-based products are, as identified in ComReg's market definition, close substitutes in the retail market. In addition, some existing copper-based wholesale products are, and may remain, inputs to fibre-based retail services. Hence, the lower the price of copper (post-investment), the weaker the OAOs' incentives to migrate to NGA services. On the other hand, the smaller the cash flows generated through copper products, the stronger the incumbent's incentives to invest in fibre where that fibre investment produces competitive retail products. Recognising these relationships forms part of the framework presented below.

- Based on the previous sections, section 6 outlines options for regulatory approaches and their implications.

- Section 7 presents regulatory considerations that are relevant under a co-investment model.

The appendices include a high-level impact assessment, providing a qualitative review of the merits of various regulatory options, and summarising regulatory approaches to regulate NGA services in the EU.

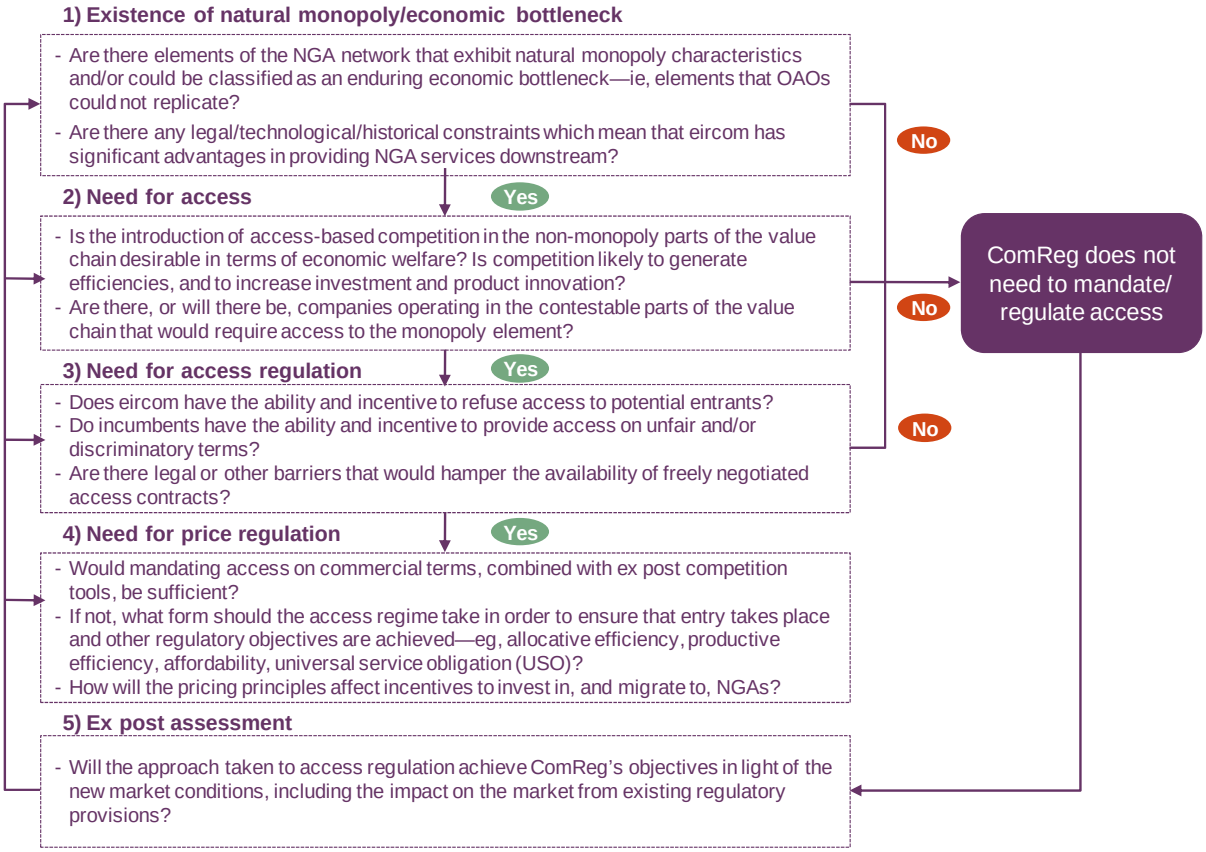
2 Pre-conditions for price regulation

2.1 Conceptual framework

The presence of an economic bottleneck and incentives and ability to foreclose are cumulative conditions to be met in order to warrant access regulation. In assessing whether a form of regulatory control on access to eircom's network is needed, it is helpful to consider a framework of analysis based on principles of best regulatory practice.[6]

Figure 2.1 presents a framework comprising five main stages, which takes account of the principles of good regulation.

Figure 2.1 Five stages in the assessment of access regulation



Source: Oxera.

This report focuses on Stage 4: 'Need for price regulation'. The first three stages are nevertheless preconditions for price regulation. Furthermore, the gravity of competition concerns identified in the first three stages influences the approach to Stage 4. In this respect, ComReg has concluded as follows:

> the advent of NGA should not be allowed to lead to a restoration of monopoly/bottleneck conditions over the access network, given that the conditions of competition are expected to be the same where eircom overlays or replicates its existing access

[6] See, for example, Better Regulation Task Force (2003). http://webarchive.nationalarchives.gov.uk/20100807034701/http://archive.cabinetoffice.gov.uk/brc/upload/assets/www.brc.gov.uk/imaginativeregulation.pdf

> network with fibre and NGA equipment. eircom's SMP will prevail across both current generation networks and next generation network infrastructure. Failing to impose some form of remedial obligations over NGA infrastructure would, amongst other things, not be in line with ComReg's statutory responsibility to promote competition and protect the interests of end users. A vertically integrated operator (across some or all parts of an industry's value chain), such as eircom, may control assets that are 'essential' by virtue of having characteristics that define it as a monopolistic bottleneck. Conceptually, the bottleneck is a facility that is necessary for the provision of services in a separate secondary (downstream) relevant market (that is, there is no choice for a competitor on the downstream market but to use the incumbent's facility), but which cannot be economically duplicated.[7]

Similar conclusions have been reached in the context of Market 5. Thus, insofar as eircom can leverage its market power across generations of access networks (ie, from PSTN/ADSL to NGA), the incumbent holds SMP also in the NGA environment, even though the underlying assets are, to some extent, different.

2.1.1 Incentives and ability to foreclose

For the purposes of this study, it is assumed that the conditions that indicate that *some form of* access regulation is likely to be needed are satisfied, and the necessary step is to assess whether the features that make it likely that the incumbent has incentives to foreclose downstream rivals exist in practice.[8] In addition, it is assumed that these prior conditions would hold for both areas where cable TV networks (UPC) provide a retail alternative and where these alternative networks are absent. This assumption implies that *in all areas* there is a regulatory objective to produce an outcome where retail competition in the provision of NGA services consists of eircom (retail), OAOs using wholesale inputs provided by eircom, and (where available) retail services provided by UPC.

The starting point for assessing incentives to foreclose is the 'vertical arithmetic' approach, which is also used by eircom's experts.[9] Put simply, this compares the costs and benefits of the incumbent associated with foreclosure. In essence, the incumbent faces a trade-off between costs in terms of lost profits upstream because the downstream rivals do not buy any more, and the benefit of higher profit downstream because some of the rivals' consumers now buy from the incumbent, possibly at a higher price.

The incumbent may not be indifferent between the two primary sources of revenue (retail and wholesale); rather, there could be additional incentives for the incumbent to justify foreclosure—in particular where the industry features are such that an entrant, by entering first the downstream market, can migrate to the upstream market. This is the case in fixed-line telecoms, where some of the regulatory remedies are considered as temporary 'stepping stones' for entrants to roll out their own infrastructure as they acquire customers and scale, and climb up the 'ladder of investment'—ie, the point of handover from the incumbent's infrastructure moves closer to the end-user, typically starting from IP-level interconnection and migrating towards ATM/Ethernet switch (bitstream) and LLU. In this case, the benefit of higher future profits upstream constitutes additional incentives for the incumbent to foreclose.

Conceptual aspects that influence the ability and incentives for foreclosure through excessive (and discriminatory) pricing are as follows.

– **Entrants' (in)ability to acquire customers the incumbent cannot**. The more homogeneous the consumers are, the greater the incentive to foreclose is. That is, after the foreclosure the incumbent can acquire more consumers from the rivals (or not lose customers to rivals); thus, the benefit from doing so is greater. Conversely, if the rivals

[7] Commission for Communications Regulation (2010), 'Market Review: Wholesale (Physical) Network Infrastructure 10/39 (Decision No. D05/10)', May 20th.
[8] Ibid.
[9] Walker, M. (2011), 'Comment's on ComReg's "Preliminary consultation on next generation access remedies in wholesale regulated markets"', Charles River Associates, October 19th.

are expanding the market by being able to acquire customers that the incumbent would not otherwise serve, the incumbent has less incentive to foreclose because, in doing so, it would lose upstream profit that it could not acquire if it provided the relevant retail service itself.

– **Switching costs**—for example, in the form of the length of the contract—can increase the incumbent's incentives to foreclose. This is particularly the case in new markets where, by capturing consumers at the start of the provision of the service, the incumbent can ensure a larger market share for itself, for a longer period of time, even if it is forced to provide access at a later date.

– **OAOs' outside options** and their attractiveness are a key determinant of the incumbent's ability to foreclose. If rivals can switch easily to an alternative platform, the incumbent simply does not have the ability to foreclose in the wholesale market. Moreover, the presence of an alternative platform may generate 'access competition' upstream if there is substantial excess capacity in the upstream market.

– **Information asymmetry** regarding the incumbent firm's upstream strategy can increase its ability to foreclose. For example, while the incumbent knows exactly when and where it is upgrading its upstream capability (and hence when and where it can offer new retail services), entrants may not have the same information. In this case, the incumbent has a first-mover advantage in the retail market, which can make it easier for the incumbent to foreclose.

A salient factor influencing the incentives to foreclose, and consequently the rationale for price regulation, is the extent to which the incumbent's behaviour is constrained by alternative platforms, either in the retail market or as alternative suppliers of wholesale inputs. Given the indirect pricing constraints, if the retail products between networks are substitutable, a price increase by the incumbent at the wholesale level could lead to a fall in retail demand for services using the incumbent's network. This can arise because either the OAOs have switched wholesale supplier, or at the retail level end-customers switch from the OAOs' services to those available from the alternative platform provider. Thus, even when there is no direct competition between different networks (namely cable and eircom's fixed line) in the wholesale layer, competition in the retail market could constrain eircom's wholesale pricing and incentives to offer wholesale services at all.[10]

Lastly, the case for price regulation may be weaker if wholesale processes are otherwise functioning and the incumbent does not, or is not able to, engage in anti-competitive non-price discrimination—for example, due to functional separation of regulated activities. In this respect, a relevant regulatory precedent is Ofcom's decision not to impose stringent price controls on Openreach's Virtual Unbundled Local Access (VULA) offering, which is expected to be the key NGA access product in the UK, at least in the short to medium term. More specifically, Ofcom decided:

> not to regulate the prices of the product(s) that BT provides under its VULA obligation. We consider that this approach will give BT the flexibility to price its VULA services according to emerging information on the demand for, and supply costs of, NGA services. At the same time, the prices of these services will be constrained by the availability of current generation broadband services and by competition from services provided over cable TV network infrastructure.[11]

Appendix 1 gives an overview of regulatory approaches in the EU (active access and physical optical distribution frame (ODF) unbundling).

[10] Inderst, R. and Valletti, T.M. (2007), 'A tale of two constraints: assessing market power in wholesale markets', *European Competition Law Review,* **28**, pp. 84–91.
[11] Ofcom (2010), 'Review of the wholesale local access market - Statement on market definition, market power determinations and remedies', October 7th, para 1.27.

2.2 Application to the context of eircom's NGA

eircom's NGA proposals relate primarily to areas where cable TV networks already sell products that would be substitutes for services provided by the eircom NGA. The above considerations are noted in eircom's response to ComReg's consultation, and elaborated on in the expert report by Dr Mike Walker of Charles River Associates:

> The implication is that eircom is unlikely to have an incentive to exclude third party access seekers and, indeed, would be rational to embrace them as customers in order to maximise the use of, and returns on, its NGA investment. This suggests that any regulatory remedy should be light touch, and that ex ante price controls for eircom's wholesale NGA products would not be necessary or proportionate.[12]

While, as outlined above, there are circumstances under which ex ante price regulation is not necessary (and can be distortive), it is not clear that these conditions currently exist in Ireland, especially outside those areas where the relevant cable TV networks are present.

2.2.1 Limited prospect for market expansion through wholesaling

As identified by eircom and its advisers, a prerequisite for removing access regulation is that there are incentives to provide access to third parties where there is a high probability that these parties can acquire retail customers that eircom could otherwise not acquire cost-efficiently. According to eircom's experts, these incentives are in place:

> eircom believes that allowing third party access will significantly increase the demand for NGA-based retail products because some of its competitors may be better placed to win business from some customer groups than is eircom (for example, because they have more efficient or effective marketing organisations or because they are able to bundle their services with products that eircom is not in a position to offer - such as television services including premium content).[13]

The extent to which eircom does indeed have incentives to offer access on non-discriminatory and reasonably priced terms depends on the distribution channels available to other operators, and the additional services that the OAOs can offer.

– eircom is active in the mobile market through its wholly owned subsidiary, Meteor, and has also bundled its mobile offerings with broadband in the legacy environment. It therefore seems unrealistic to assume that eircom would, in the absence of price regulation, provide access to other mobile operators on fair and reasonable terms in order to acquire customers who prefer bundles that include mobile services.

– It could be in eircom's interest to compete against UPC by including in its broadband packages a credible TV offering. eircom could provide IPTV services independently, and it is Oxera's understanding that it will do so. A further route to broadcasting revenues could be by providing wholesale access to an entrant with rights to broadcast content that is not available on free-to-air TV, for example, and which is therefore better placed than eircom to provide triple-play. However, there is no evidence to date of such a form of 'collaboration'.

– In the mobile market, where commercially agreed access terms are witnessed (for example, Tesco and Lycamobile in Ireland), the rationale stems from excess capacity *and* the ability of 'virtual' operators to market subscriptions through alternative distribution channels (eg, supermarket chains). There is no evidence of any significant extent of this type of market entry in the Irish broadband market.

[12] Walker (2011), op. cit.
[13] Ibid, para 23.

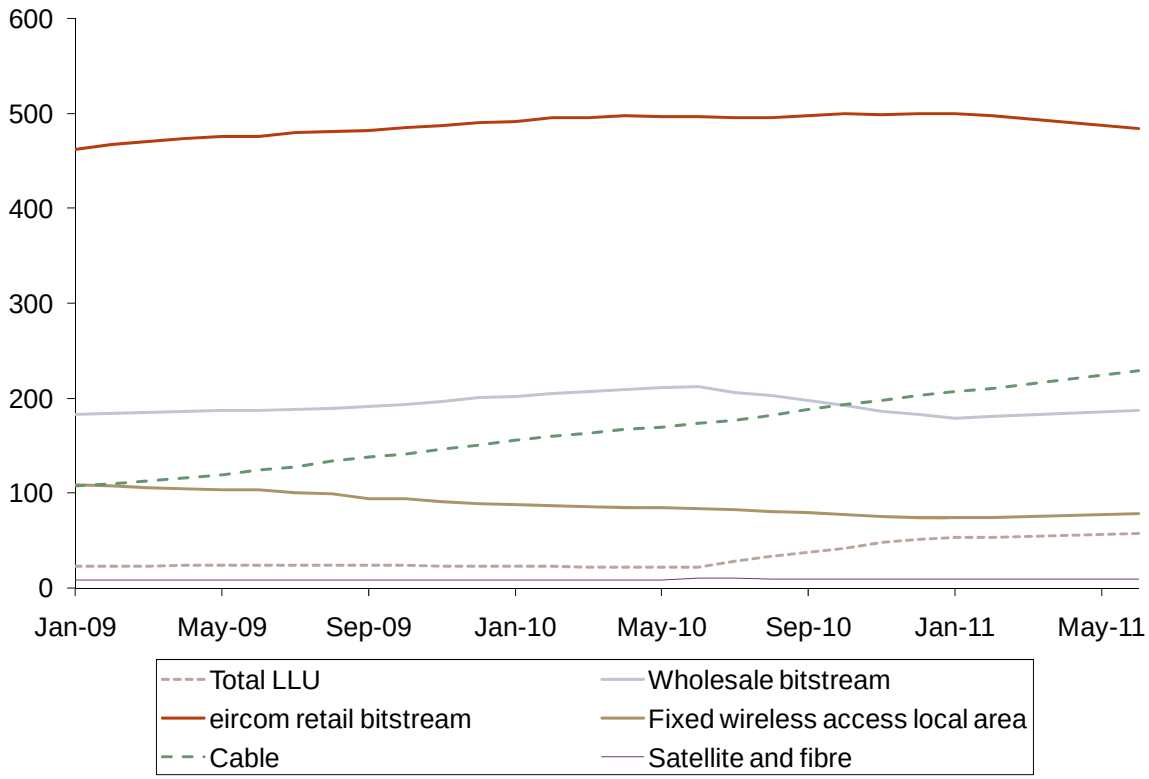
Given these reasons, eircom's reasoning that it could have a strong incentive to offer access to wholesale products on non-discriminatory terms, while conceptually sound, is not yet backed by robust evidence that these market dynamics are actually present.

Should eircom roll out NGA networks outside the footprint of the cable TV networks, this dynamic would not operate, and any incentive to offer third-party access to wholesale products would appear to be absent.

2.2.2 Relatively low LLU take-up is unlikely to significantly constrain NGA pricing

Figure 2.2 shows that ADSL provided by eircom retail remains the most popular form of broadband Internet connection in Ireland. There has been a fall in the number of wholesale bitstream connections, as some OAOs have migrated customers to LLU connections. Nevertheless, eircom's position relative to that of the OAOs using the copper loop (ie, wholesale bitstream and LLU operators) has remained relatively unchanged over the past two years, with the difference in the number of connections remaining relatively constant. eircom's position relative to cable, in particular, has worsened to some extent. Satellite and fibre remain fairly insignificant in scale, and fixed wireless access is steadily declining.

Figure 2.2 Number of fixed broadband Internet subscriptions by type ('000)



Source: ComReg.

Data on net additions provides further insight into the dynamics of competition in the areas where UPC is active. While the numbers are still somewhat modest in relative terms, and do not reflect competition in the national market, it is apparent that consumers are responding to UPC's relatively attractive product offering, putting pressure on both eircom and its wholesale customers. UPC's footprint is increasing, but its overall market share is still modest relative to that of cable operators in some other countries—eg, the UK (albeit only marginally), the

Netherlands, and in Belgium where regulators have nevertheless concluded that the incumbent telecoms operator has SMP.[14]

Overall, while eircom's pricing is constrained to some extent by UPC's offerings in those areas where there is cable TV, most of the OAOs have not gained any considerable share of the market in the past few years. Where entry has occurred, it still relies on rather stringent price regulation in both Markets 4 and 5. This might suggest that:

– there are considerable switching costs (which may result from non-price discrimination in wholesale processes);

– eircom may not have sufficient incentives to adjust its retail *and* wholesale prices on the basis of the retail prices prevailing in these areas, thus making its own and OAOs' offerings uncompetitive; and/or

– within these areas the technology underpinning eircom's retail offerings is not capable of matching (economically) the services that the cable TV networks can provide. As a consequence, there is little direct evidence that eircom's market position means that it has a positive incentive to offer wholesale access products to third parties, in the absence of ex ante controls. Simple reliance on retrospective margin squeeze controls would represent a risk under the future NGA conditions.

2.2.3 FTTC architecture may enhance eircom's market power in the access network

The ability of OAOs to offer differentiated and tailored retail services is an important driver of downstream competition in the broadband market. This includes the ability to specify the technical parameters of the service (bandwidth, contention ratio, traffic prioritisation and customer premises equipment) and the ability to create innovative and appealing retail price structures.

In the legacy environment, entrants can largely design the retail product specification (on the basis of the above parameters) by means of LLU. The business case for physical unbundling is limited in the FTTC context, as the minimum network that an OAO would need to gain exclusive control of the physical, passive, infrastructure is considerably more extensive (and expensive). As noted by Ofcom, 'many in the industry regard FTTH and GPON as solutions that feel more durable than FTTC.'[15] Therefore, the NGA deployment is likely to enhance, not erode, eircom's market power relative to that of the OAOs, and its ability to tailor wholesale inputs to meet its own retail requirements.

2.2.4 Comments from OAOs are indicative of some non-price discrimination

Should there be evidence on fair and non-discriminatory treatment of OAOs, there could be a stronger case for a 'light touch' approach to price regulation. By way of comparison, eircom is not subject to the same equivalence measures as BT in the UK, namely equivalence of inputs and outputs (implemented as part of functional separation). Indeed, a number of responses to ComReg's preliminary consultation, as well as to Oxera's questionnaire circulated for the purposes of this study, highlighted concerns about eircom's performance in delivering wholesale inputs to OAOs on terms equivalent to those used for its own retail arm.[16] According to the OAOs:

✂

[14] The fibre access of KPN, the Dutch incumbent, is price-regulated (ODF access). See appendices for further details.
[15] See http://media.ofcom.org.uk/2011/11/08/competition-and-investment-in-superfast-broadband/?utm_source=updates&utm_medium=email&utm_campaign=total_telecom_world.
[16] As part of the process, questionnaires were prepared by Oxera and circulated to operators by ComReg. Oxera (2011), 'Follow-up questions in the context of ComReg's NGA consultation', October 20th. Oxera (2011), 'Follow-up questions in the context of ComReg's NGA consultation', October 24th. Oxera received written responses from BT, eircom and Magnet; Vodafone responded verbally over the phone.

✂

Box 2.1 summarises the responses of some of the OAOs interviewed as part of this study to Oxera's questions. While a degree of caution should be exercised in interpreting any of the respondents' responses, the concerns highlighted provide an indication of the types of problem that the entrants are facing.

Box 2.1 Summary of responses received from some of the OAOs interviewed for this study

✂

✂

While it is outside the scope of this report to assess the extent to which eircom's engagement with the industry and development of a form of 'ring-fencing' have resulted in the desired outcomes, there is no evidence to suggest that all the entrants' concerns relating to wholesale processes have been diluted or, indeed, removed. That said, should eircom demonstrate compliance with equivalence standards going forward, there might be a case to reassess the merits of stringent regulation.

2.3 Geographical differences

Geographical differences in competition matter for the design of remedies, for two main reasons.

– It may be necessary to adjust the implementation of price controls depending on the competitive dynamics in different areas (ie, owing to specific assumptions embedded in price regulation and associated cost models—discussed in detail in section 3).

– The relationship between copper and fibre access prices and the consequent incentives to invest are driven by competition from alternative platforms, where these exist. As discussed in further detail in section 3, insofar as upgraded cable offerings (DOCSIS 3.0) are indeed superior to the current-generation broadband, the economic value of the existing (copper) assets may be low in areas where the cable TV network caps retail

prices at levels below eircom's apparent costs based on current valuations (and treatment) of those assets.

In addition, notwithstanding the regulatory imposition of national price controls (ie, geographic averaged prices), the costs underlying the supply of services (both copper- and fibre-based) do vary regionally.

The economics of NGA deployment are dictated by economies of demand density, which are also likely to apply to most other platforms (eg, cable TV). Where infrastructure competition is confined to low- (unit) cost areas, there are reasons to allow pricing to reflect the degree of competition in different areas, as the European Commission has recognised:

> NRAs [national regulatory authorities] should examine differences in conditions of competition in different geographical areas in order to determine whether the definition of sub-national geographic markets or the imposition of differentiated remedies are warranted. Where divergences in the conditions of competition are stable and substantial, NRAs should define sub-national geographic markets in accordance with Recommendation 2007/879/EC. In other cases, NRAs should monitor whether the deployment of NGA networks and the subsequent evolution of competitive conditions within a geographically defined market warrant the imposition of differentiated remedies.[17]

As concluded in the most recent SMP determinations, although the WPNIA and WBA markets are defined as national in scope, there may be a case to apply distinct geographic areas in which the conditions of competition vary, and, if so, to consider whether access remedies might also need to vary geographically. Failure to do so could result in a supplier constrained to nationally averaged prices being forced out of the low-cost markets (because its prices are uncompetitive) or failing to recover its costs in the high-cost areas (because the price that makes the firm competitive in low-cost areas is below cost in the high-cost areas).

The principles to determine geographic areas could follow principles consistent with those established by Ofcom and accepted by the European Commission:

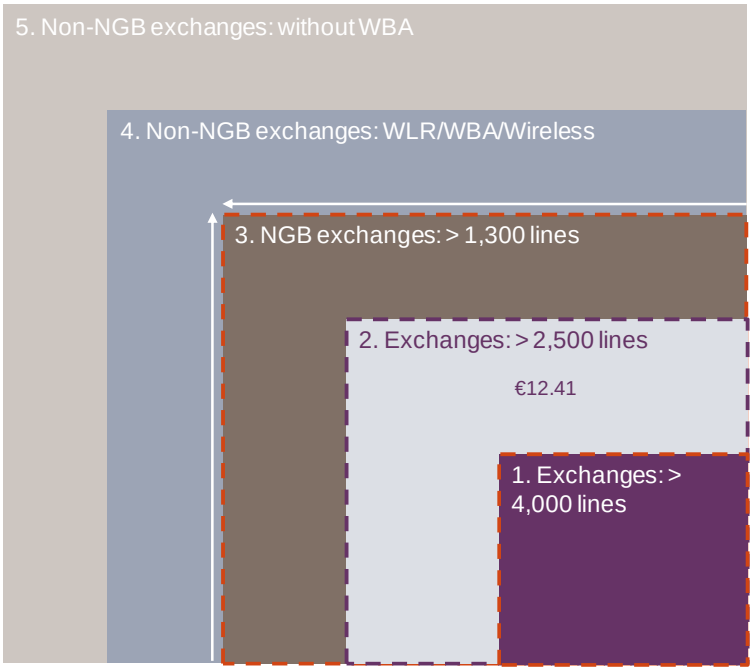
– **stage 1**: choose an appropriate geographical unit of analysis that is small enough that competitive conditions are homogeneous within it, but large enough that it remains practical to collect and analyse information;

– **stage 2**: ascertain the homogeneity of competitive conditions by assessing geographical units against criteria such as barriers to entry, numbers of suppliers, distribution of market shares, and price differences. This is similar to the analysis required to determine SMP, but is not meant to be a fully fledged market analysis. Ultimately, ComReg would need to aggregate areas with homogeneous competitive conditions, as indicated by the application of the criteria. [18]

In an ongoing consultation, ComReg has defined five areas in terms of exchange sizes, as illustrated in Figure 2.3 below.

[17] European Commission (2010), 'Draft Commission Recommendation of [...] on regulated access to Next Generation Access Networks (NGA)', SEC(2010) 1037.
[18] However, in the context of the example referred to here, the stronger intra-platform competition through LLU allowed for this regulation. In the Irish context it might be primarily the inter-platform competition through cable that could allow for this approach.

Figure 2.3 Geographic areas in Ireland



Source: ComReg (2011), 'Review of the appropriate price controls in the markets of Retail Fixed Narrowband Access, Wholesale Physical Network Infrastructure Access and Wholesale Broadband Access: Further specification of certain price control obligations in the markets of Retail Fixed Narrowband Access and Wholesale Physical Network Infrastructure Access', document number 11/72, October 10th, p. 15.

In defining areas with structural differences in this context, it would seem reasonable to apply consistent principles. In particular, the design of remedies for NGAs should recognise the distinction between areas where:

– NGA will not be deployed ('non-NGA footprint area') and where no LLU is expected to occur and, if anything, OAOs rely on WBA (areas 4 and 5);[19]

– FTTC/H will be deployed ('NGA footprint area'), and where UPC has a footprint;

– FTTH/C will be deployed, and where UPC does not have a footprint.

2.3.1 What are the implications of geographical differences for pricing principles?

In areas where the cable TV network provides an infrastructure-based alternative to both existing and NGA services, a potential concern is that the retail price that it can charge ('copper' technology), or will be able to charge (NGA technology) based on the current regulation of cost-based wholesale inputs, will render these retail services uncompetitive. In addition, any OAO using eircom's wholesale inputs would face the same constraint. Put another way, the OAOs' economic prices might be competitive with eircom's offerings, but neither would be competitive with the cable TV offerings.

Insofar as this pricing constraint exists, the current cost-based price controls are not constraining eircom in these areas. This is because the optimal price response to competition by eircom is lower than that indicated by the current regulatory price ceilings for copper access products. (LLU, SLU and line share are subject to price ceilings below which eircom is allowed to set its charges.) However, even if the retail price is constrained by the cable TV networks, if OAOs can compete with a competitive eircom, the relationship between eircom's retail price and the wholesale inputs will still need to be set such that no margin squeeze occurs and, critically, eircom does not set its prices below the relevant costs.

[19] According to ComReg, this area consists of exchanges with fewer than 1,800 lines, where fibre is unlikely to be deployed in the access network.

Outside the UPC areas, this particular constraint is unlikely to arise and eircom's retail prices will not be constrained by an alternative platform (to the extent LLU operators are not present in exchanges beyond UPC's footprint). To the extent that eircom's retail prices are constrained by competition from OAOs, these OAOs will be using one or more of eircom's wholesale services as an input. It is these inputs that are currently price-controlled on a cost-oriented basis (LLU, SLU) or via a margin squeeze test (bitstream, WLR). In the latter case, the prices from which the margin squeeze test is calculated may themselves be price-controlled on a cost-orientation basis.

As competitive conditions outside the cable TV areas where eircom is rolling out NGA will not change significantly, there would appear to be no reason to adjust the current form of price control, unless eircom sets uniform retail prices for its fibre products. This would allow ComReg to use the same approach for the whole NGA footprint.

Within the cable TV areas, which is broadly the footprint of eircom's proposed NGA roll-out (although likely to be smaller than eircom's NGA footprint in the future), the market dynamics are rather different. Some or all of the price controls that are cost-oriented and set with maximum prices would appear to be non-binding if eircom is to provide a competitive retail offering. Although there is no direct regulation that stops eircom from charging itself and others lower prices for cost-oriented wholesale services, and nothing directly stopping eircom from reducing its retail prices below the level of any cost-oriented cap, if OAOs are to remain competitive with eircom in these areas, the margin squeeze requirements will need to be retained. The evidence that eircom has a strong commercial incentive to provide these wholesale services at competitive prices is weak; hence, relying on ex ante margin squeeze intervention would represent a significant regulatory risk.

This suggests that, within the NGA areas, the margin squeeze test should at a minimum be applied to maintain the economic space for (efficient) OAOs to purchase eircom's wholesale NGA services and compete successfully (at least with eircom) in the downstream market. However, the application of these two solutions raises other pricing issues:

– the components of both the copper service and the fibre services are not mutually exclusive. As a result, the *same* component could be priced differently inside and outside the cable TV footprints. If the price of such a component is reduced inside the cable TV areas and this then lowers the component price outside these areas, retail prices may be expected to fall across all of eircom's footprint (ie, both inside and outside the cable TV areas);

– even inside the cable TV areas, dual-use components will exist and a reduction in their price to make NGA services competitive with cable TV will, if carried across into the legacy copper services, reduce the price of those services as well.

Under eircom's proposed roll-out, the full copper network will remain in place, at least in the short term. As a result, within the NGA footprint the full set of existing legacy services will (technically) remain available. As such, changes to the wholesale price of the 'dual-use components' may have an impact on the costs of providing the current, copper-based, broadband services.[20]

2.4 Recommendations on the price control

The following approaches would seem advisable.

– Within the cable TV footprint, eircom's ability to overcharge its retail customers would appear to be limited. However, the incentive to provide competitive wholesale services to third-party access seekers on commercial terms appears to be equally weak. Ex ante

[20] The link between legacy and NGA pricing is explained in section 3.3.

regulation of the margin squeeze between eircom's retail prices and wholesale prices would appear warranted. The conditions under which no price controls would be necessary are not met.

– In areas where NGA will be rolled out beyond the existing UPC footprint, the constraint on excessive prices provided by the cable TV networks would be absent, unless imposed indirectly by other regulatory requirements. Furthermore, LLU-based OAOs may also constrain eircom's retail pricing, albeit to a limited extent beyond commercially viable areas. Some form of additional price control might therefore be appropriate in these areas.

– To maintain regulatory coherence both across geographic areas and through time, ComReg may need to consider the extent to which geographically de-averaged pricing could be deployed for retail and wholesale products where eircom chooses to de-average prices (eg, PSTN line rental services). Additionally, ComReg may need to consider the extent to which wholesale price discrimination is allowed where assets are used for more than one purpose (as discussed below).

3 Form of price control: conceptual assessment of approaches to price regulation

3.1 Margin squeeze test or cost-plus?

As implied in the decision tree presented in section 1 (Figure 2.1), having established that some form of price control is warranted, the first choice to be made is whether a cost-plus or a margin squeeze test control would be more suitable for NGA. In this respect, the European Commission's Recommendation makes the following statement:

> NRAs could use other appropriate price control methodologies including, e.g. retail-minus, where there are sufficient competitive constraints on the downstream retail arm of the SMP operator. NRAs should set different prices for different bitstream products to the extent that such price differences can be justified by the underlying costs of service provision so as to enable all operators to benefit from sustained price differentiation at both wholesale and retail levels. The risk incurred by the SMP operator should be duly taken into account in setting the access price.[21]

The primary properties of the two approaches to determining access charges can be summarised as follows.

– **Cost-plus**—this approach considers the actual cost of providing access. In general, it will not necessarily represent the optimal access price, although it may lead to optimal pricing in some circumstances. Set out in more detail below are the conditions under which cost-based pricing may be appropriate. However, within cost-plus systems, different cost concepts are relevant in different circumstances when setting cost-based access charges. This, in turn, can lead to significantly different values for the cost-plus price.

– **Margin squeeze test**—this approach is of particular relevance when retail prices are constrained by some regulatory process, or (as is often relevant in the telecoms sector) by the retail prices of alternative platforms.[22] It states that the access charges should be set no higher than the retail price minus the costs incurred by the incumbent in providing all those services over and above those of the access service itself. In some versions of the test, the incumbent's lost profit in retail markets caused by providing access is also added to the access price (ie, not taken away from the retail price).[23] The basic intuition of a margin squeeze test relates to providing adequate incentives for the entrant's make-or-buy decision and achieving productive efficiencies. This is so because, under this test, entry would occur only if the entrant is more efficient (ie, productive) than the incumbent.

  Consistent principles apply in ensuing that the economic space between different wholesale inputs is sufficient. A sufficient economic space is needed so that the OAOs have the right incentives to invest in their own equipment, and that pricing of different wholesale inputs is consistent throughout the supply chain (ie, there are no undue cost disadvantages in using certain inputs relative to others).

[21] European Commission (2010), 'Commission Recommendation of 20 September 2010 on regulated access to Next Generation Access Networks (NGA)', September 20th.
[22] This is not to say that it is necessarily *appropriate* to these conditions, but rather its chief relevance to an assessment of optimal access prices arises in that circumstance.
[23] The efficient component pricing rule is sometimes referred to as the 'margin rule', where the access charge is equal to the incumbent's retail price minus the incumbent's cost in the retail activity. The margin rule could be understood as a special case of the more general definition, however, as further explained in the appendices.

A number of conceptual considerations need to be taken into account when choosing between the two possible approaches. They each have advantages over the other depending on the specific circumstances.

– **Competition concerns** (upstream prices might be an issue if the downstream market is not competitive). If the retail market is not competitive, the retail price used for the margin squeeze test approach can be too high, leading to excessive prices for the wholesale products (and ultimately to over-recovery) as well. On the other hand, cost plus uses a bottom-up method based on a hypothetical efficient firm which theoretically aims to mimic the competitive outcome upstream. (Upstream prices might be an issue if the downstream market is not competitive.)

– **Responsiveness to changes in the market** (in particular, changes in costs, demand). If there are substantial unexpected changes in the wholesale or retail cost, these might affect the incumbent's or the OAOs' position in the market. For example, in the case of cost-plus, an unexpected increase in the wholesale cost might jeopardise the recovery of the incumbent's investment.

– **Predictability for OAOs to allow them to adapt their businesses**. Predictability of the wholesale prices can be essential for OAOs and new entrants to enable them to plan their businesses effectively. Transparency of wholesale pricing enables them to compete with the incumbent on an equal footing. This can be ensured under both approaches, for example by mandating the incumbent to publish reference offers in advance.

– **Practicality and ease of implementation**. Practicality in terms of implementation hinges on data availability, but also needs regulatory decisions. In particular, the essentially forward-looking, cost-plus method requires information on future costs and demand to derive wholesale unit prices. Moreover, the regulator has to decide on the allocation of fixed and common costs and, in the context of a margin squeeze test, the treatment of bundles.

Table 3.1 summarises the above discussion.

Table 3.1 Comparison of cost-plus and margin squeeze test

	Cost-plus	Margin squeeze test
Competition	Conceptually, if the right cost standard is used, this approach mimics the competitive outcome	A high upstream margin can prevail if downstream competition is weak. In the presence of strong retail competition and price constraints from alternative platforms, this approach can avoid the need to specify the 'right' cost standard for the wholesale service
Responsiveness to market changes	Can be an issue for wholesale cost changes	Unlikely to be a major issue with respect to costs
Predictability	Can be ensured	Can be ensured
Practicality	Allocation of common costs across the business can be problematic Forecasting costs and demand can be problematic	Treatment of bundles can be problematic

Source: Oxera.

In conclusion, cost-plus might be preferred if:

– there are concerns about retail competition, with the risk that retail prices are too high;
– there are large unexpected shocks to retail costs; and

– the treatment of bundles proves to be problematic;

whereas the margin squeeze test might be preferred if:

– downstream competition is strong enough;
– there are concerns about demand uncertainty that necessitates a sufficient degree of price discrimination to be allowed;
– there are unexpected shocks to wholesale costs;
– uncertainty around future costs and demand prevents robust forecasts;
– bundling is not an issue or prices for each meaningful combination can be derived.

An alternative approach would be to introduce a margin squeeze test as the primary approach, but to cross-check the resulting wholesale charges through an assessment of the relevant costs in order to ensure that prices are not significantly above or below costs (the latter could be a more relevant concern in this context). This has been Ofcom's approach in the context of regulation of BSkyB (Sky), for example (see Box 3.1).

Box 3.1 Ofcom's approach to the pay-TV market

Ofcom developed the following approach to set prices for premium channels in the UK pay-TV market.

– Ofcom derives retail-minus prices by considering a DCF analysis. It determines the wholesale price that an efficient retailer could afford to pay given its own retail costs and the need to earn a return, while matching the incumbent's (Sky) current retail prices. Notably:

> We have derived prices for competitors that would be as efficient as Sky at equivalent scale, but do not have the same scale as Sky. Given the number of subscribers Sky has built up, there is not room in the market for more than one firm to have the same scale as Sky currently has. Therefore any remedy which sets out to ensure fair and effective competition has to allow for smaller scale. However, our approach is also designed to avoid the costs of market entry by firms that are either inefficient or unable to achieve sustainable scale

– Ofcom cross-checks these against cost-plus prices, also based on a DCF analysis, by determining the price that Sky's wholesale business would need to charge to earn a reasonable return given its input costs.

The main reason Ofcom opted for this approach is its concern that cost-plus risks artificially depressing rights values, which are the main cost driver for the channels in question. In particular, firms are unlikely to bid vigorously for content because they realise that they would push up the future wholesale price of the channels they purchase. This would result in lower returns in production of content, which would affect the quality and variety to consumers. Using the margin squeeze test avoids this issue.

However, Ofcom acknowledges that, with the margin squeeze test approach, it cannot tackle concerns about high wholesale margins stemming from monopoly over rights. Thus, the cost-plus cross-check is applied to ensure that the starting prices derived by Ofcom afford a reasonable return (and not more) to Sky's wholesale business, given the underlying input costs.

Source: Ofcom (2009), 'Pay TV phase three document: Proposed remedies', June 26th.

3.1.1 Time consistency

Under what circumstances is it appropriate to apply cost-plus regulation? The reasons underpinning the margin squeeze test approach were discussed above. As also noted, the cost-plus approach has apparent merits in ensuring that wholesale prices are indeed cost-reflective. As also noted by eircom, predictable demand is a prerequisite for a (forward-looking) cost-plus approach. The following factors are subject to a degree of uncertainty:

– the extent to which wholesale customers currently unbundling whole copper loops will move to eircom wholesale NGA offerings;

– the degree to which the presence of eircom NGA offerings will slow or reverse migration to alternative infrastructure platforms such as cable;

– the extent to which the presence of enhanced NGA products will stimulate take-up by customers new to any broadband.

According to eircom, 'the critical issue is not the actual level of take-up but the point of time in the development of the market for NGA services when the fill on the eircom network stabilises to the extent that it is possible to forecast service volumes with reasonable confidence'.[24] This seems conceptually reasonable. In practice, the construction risk is likely to be diluted once the main roll-out is completed and more information is gained, for example about civil engineering costs (ie, after a few years). Similarly, demand conditions could be assessed as part of the next review. If there is evidence of more stable demand (decreased volatility), ComReg could consider introducing cost-plus.[25] However, it is noted that the pricing constraint from UPC (and potentially LLU operators) undermines the case for cost-plus regulation, and insofar as this constraint is also present in the subsequent regulatory periods, the margin squeeze test may suffice.

3.2 Assumptions underlying economic space and the margin squeeze test

Where an ex ante price regulation follows margin squeeze test principles, the following methodological considerations are relevant.

– **OAOs' efficiency**. Should the test be based on an equally efficient operator (EEO), a similarly efficient operator (SEO) or a 'reasonably efficient operator' (REO)? The EEO approach requires data on eircom's costs and needs to be applied flexibly to account for economies of scale and scope. The EEO test—typically applied in ex post competition investigations—may be more suitable when the regulatory concern is to ensure that existing entrants are not squeezed to exit the market. The SEO test is typically considered to assist entry to achieve long-term dynamic benefits, while assuming that the entrant has the same (efficient) cost structure as the incumbent but smaller scale. Finally, the REO test also aims to assist entry, but uses the costs borne by a hypothetical efficient entrant.

– **Cost standard**. Is the long-run average incremental cost-plus (LRAIC plus) approach the most appropriate model for capturing retail costs, or would a fully allocated cost (FAC) (or average total cost, ATC) model be more suitable? The decision on cost standard is informed by an assessment of the economies of scope available to OAOs relative to eircom. The more that fixed and common costs are incorporated in the retail cost standard, the lower the access charge will be relative to the retail price.

– **Level of aggregation**. Should the margin squeeze test be applied to individual products? Applying the test on the basis of a 'portfolio' approach would allow greater (efficient) price discrimination, but would also allow eircom to discount selective products where competition is most intense, potentially harming other providers that have a smaller range of products.

These aspects need to be addressed to ensure (ex ante) both that eircom does not engage in pricing structures that would result in a margin squeeze between retail and wholesale offerings, and that a sufficient economic space exists between different wholesale inputs.

[24] eircom response to ComReg's preliminary consultation.

[25] Oxera's report on co-investment considers the risk profile of NGA investment and its implications for financing and regulation, based on discussions with industry experts. Oxera (2011), 'How a co-investment model could boost investments in NGA networks: Feasibility and implementation of a co-investment model', November, available at www.oxera.com.

3.2.1 Rationale for economic space

While the rationale to prevent a margin squeeze between retail and wholesale charges is perhaps more apparent, the concept of economic space between wholesale inputs builds on a slightly different economic underpinning. In particular, insufficient headroom could not only foreclose an OAO, but it could also impede the development of facilities-based competition, to the long-term detriment of competition in the Irish market. In particular, providing sufficient economic space between wholesale inputs would enable entrants that have reached a certain scale to move up the ladder of investment, searching better margins that are a consequence of the price differences and the increased economies of scale. The European Regulators Group (ERG) has provided some guidance on these issues:

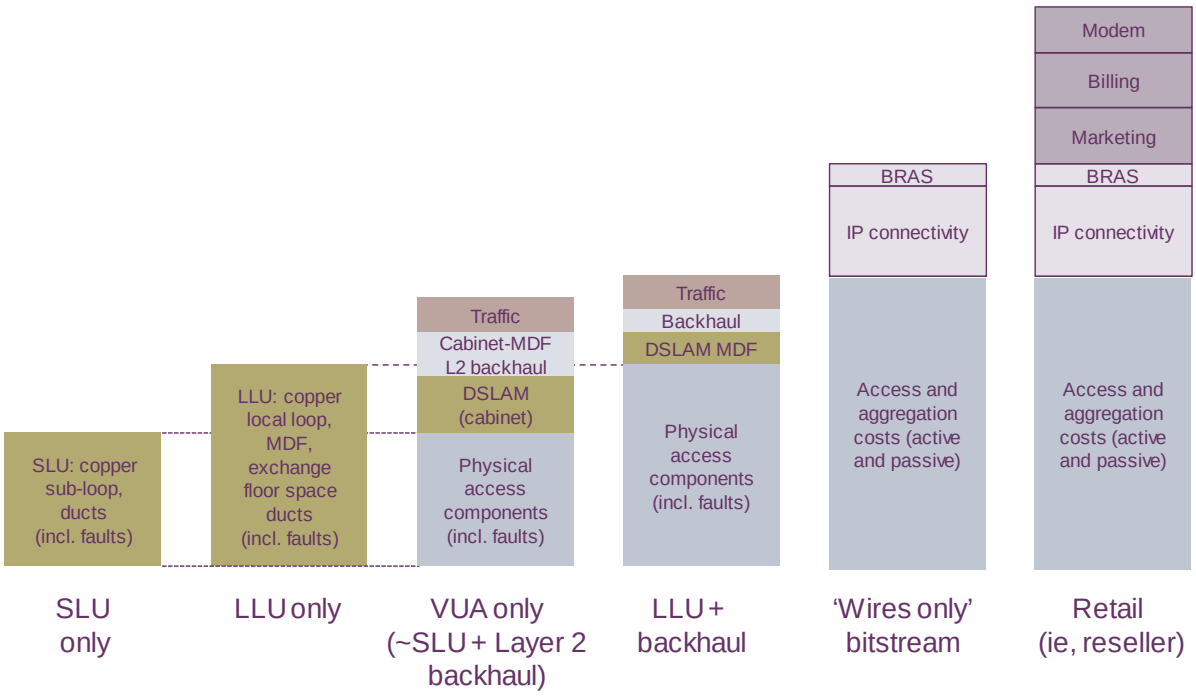
> NRAs should ensure that the economic space between WBA and LLU prices should be wide enough so as to avoid eviction prices and not hinder competitors' investments in LLU in alternative infrastructure by artificially restraining LLU extension. Furthermore NRAs should ensure that the economic space between WBA and LLU prices should be not too wide in order to avoid excessive pricing in the retail market especially in underserved areas.[26]

Specifically, in the Irish context, the economic rationale for economic space is twofold:

– ComReg's objective is to promote competition based on independent infrastructures and to encourage the functioning of the ladder of investment;
– eircom should not be allowed to price below relevant costs—as also stipulated by competition law.

The ongoing migration to NGA implies changes to the wholesale products, and points of handover, available to OAOs. In particular, responses to Oxera's questionnaire highlight that the scope for physical access is likely to be limited in the NGA environment. Figure 3.1 summarises the wholesale inputs, and the relevant cost elements between them, from an OAO's perspective.

Figure 3.1 Costs of passive and active access—wholesale inputs purchased from eircom



Source: Oxera, based on ComReg and eircom.

[26] European Regulators Group (2009), 'ERG Report on Price Consistency in Upstream Broadband Markets', June, p. 11.

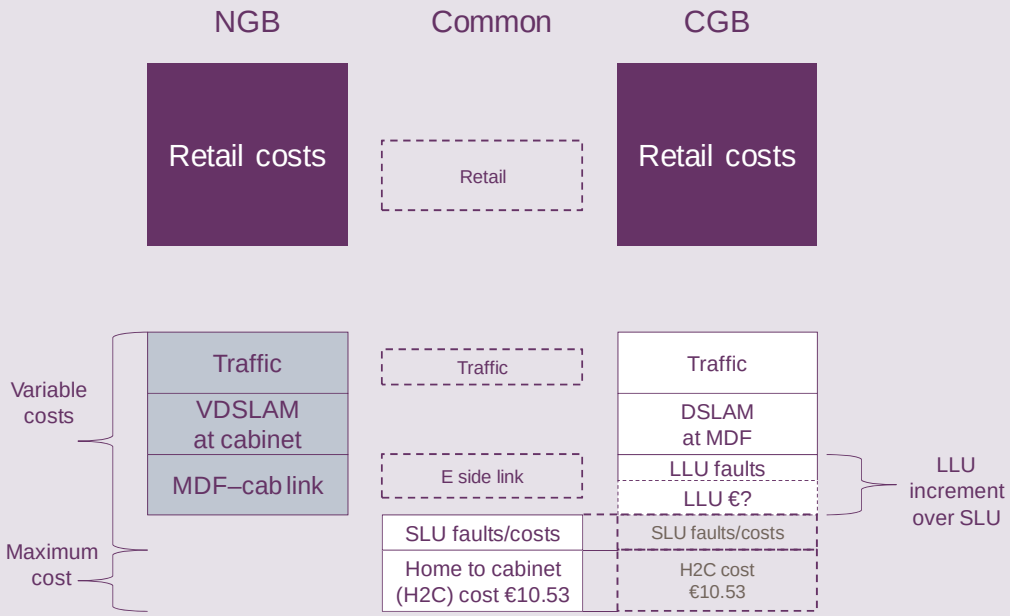
3.3 Economic space between legacy and NGA products

In the context of NGA roll-out, the notion of economic space can be extended to include the economic space between LLU and VUA, even though LLU is not a direct input into VUA, for the following reasons (see also Box 3.2).

– SLU is a common input into both access products, so a consistency requirement between SLU and LLU, on the one hand, and SLU and VUA, on the other, indirectly implies a consistency requirement between LLU and VUA.

– Efficient migration from copper to NGB can be ensured (as discussed in section 5) with the right price signals for OAOs and final consumers. This requires LLU and VUA prices to be consistent with the quality and other aspects of these products.

Box 3.2 Cost stacks for current and next-generation access



Source: Oxera.

– The 'Common' cost stack reflects cost elements that are able to be shared between NGB and CGB broadband products, such as retail costs including marketing, billing and distribution channels.
– Both NGB and CGB products require the same sub-loop (D side) connection from the home to the cabinet, so this element of the cost stack is identical.
– The connection from the cabinet to the exchange (E side) may have some common cost elements (eg, the duct), although NGB uses a fibre connection and the CGB uses the existing copper tie cable, which are separate. As the local loop consists of the sub-loop plus the E side copper connection, the LLU link and fault costs should reflect increments over the SLU costs only.
– The DSLAM and VDSLAM equipment costs are specific to the NGB/CGB cost stacks since they cannot support services outside their generation.
– Traffic costs, such as backhaul, core network transport and peering, may have specific components (NGB services may have differing demand profiles and traffic types) and common costs associated with shared platforms.
– The common cost of the sub-loop implies that changes to the SLU price will have implications for both the NGB and the CGB cost stacks.

Since LLU (or legacy broadband for end-consumers) and VUA (or fibre broadband for end-consumers) are substitutable (during the transition period), the 'quality-adjusted' relative price between them is of some importance to ensure efficient migration. In particular, if the

relative price is not in line with the quality of these products, the decisions of OAOs and end-consumers will be distorted. For example, if the LLU price is 'too' low then OAOs and end-consumers will have limited incentives to migrate to the NGA solution; if it is 'too' high relative to the corresponding NGA products, OAOs have incentives to migrate; nevertheless, this carries the risk that the current LLU investments (mainly by BT) do not receive sufficient remuneration over the asset lifetime (which is relatively short). Given that ComReg's regulatory policy reflected in its decisions has thus far promoted LLU, it would seem reasonable to take into account a transition period over which the migration to VUA would take place. This is discussed further in section 6.

In areas where NGA is not (yet) deployed, the (actual) LLU cost sets a constraint on how far the wholesale price can be reduced, since sufficient economic headroom should be secured between wholesale inputs and the LLU price.[27] As regards the NGA areas, the question that needs to be addressed is whether there is a realistic business case to enter the market using passive access inputs under the NGA topology adopted by eircom.

Studies commissioned by various NRAs show that, even in relatively densely populated countries such as Belgium and the Netherlands, the business case for SLU in the current market conditions is clearly not as economically feasible as for LLU.[28] Furthermore, Oxera has not found any evidence of large-scale take-up of SLU in any of the Member States, even though, as shown in Table 3.2, the SLU product is currently available in a number of countries. This may be a reflection of regulators' reluctance to exclude the option of an operational ladder of investment at this stage in the market development.

Table 3.2 Regulation and availability of SLU in selected Member States

Country	Availability	Current regulatory obligations
Belgium	Mandated	Access products available for local loop and sub-loop, with distinction between raw copper and shared pair; transparency obligations
Denmark	Mandated	Transparency, reference offer, non-discrimination, access to shared and full copper line (sub-loop)
France	Regulated offer (planned)	Transparency, reference offer, non-discrimination. Specific obligations in case of 'mono-injection': colocation and fibre backhaul at the sub-loop + financial compensation for sunk costs
Germany		Reference offer: non-discrimination obligation
Hungary	Mandated	Access obligation, transparency (reference offer), non-discrimination
Norway	Mandated	Access obligation, price regulation, non-discrimination, reference offer, cost accounting obligation
Portugal	Mandated	Transparency in the publication of information, including reference offers. Non-discrimination in the provision of access and interconnection. Separation of accounts for specific activities. Price control and cost accounting and financial reporting
Spain	Mandated	Transparency, non-discrimination, access obligations
Sweden	Mandated	Transparency, reference offer, non-discrimination, access obligations
Switzerland	Mandated	Cost-based price regulation on hold as parties agreed to renegotiate. Colocation if capacity is available
UK	Mandated	Transparency (notifying changes in charges and terms and conditions; notifying technical information); f reference offer (including contents and processes for updating); non-discrimination obligations; access obligations (while the obligation could cover shared cabinets, the current reference offer covers separate cabinets only)

Source: BEREC, Ofcom.

[27] This is consistent with the argumentation presented in ComReg (2010), 'Consultation and Draft Direction: Further Specification of the Obligation not to Unreasonably Bundle Pursuant to D07/61', January 6th.
[28] See http://ec.europa.eu/information_society/policy/ecomm/doc/implementation_enforcement/annualreports/14threport/be.pdf.

Furthermore, eircom has stressed that maintaining an SLU product would be detrimental for the technology of vectoring, which in turn would enable better quality of service (including higher speeds).[29]

However, notwithstanding whether the ladder of investment will be operational in the NGA environment or whether there is a case for SLU, the second principle set out above would need to be complied with: eircom would not be allowed to price below costs where these are defined as the prices that it would charge for the relevant wholesale inputs (even if it had an incentive to do so in the short term). The price of SLU, and other relevant passive access inputs, sets a benchmark for the costs underlying any active access, wholesale or retail, product, but this does not mean that the current LRIC-based SLU price should be considered as a price floor. Rather, principles of asset valuation suggest that, in the presence of pricing constraints on the one hand, and where the assets are non-replicable on the other, prices below the BU-LRAIC plus (current-cost accounting) benchmark may be appropriate and consistent with 'cost orientation' (this is discussed in further detail below).

In all, given the above reasoning, a consistent application of margin squeeze principles means that where NGA is deployed, the price of LLU and SLU should be set with reference to the relevant NGA products and may need to be reduced in order to avoid a margin squeeze.

3.3.1 Designing the margin squeeze/economic space test

The regulated level of wholesale prices, however reached, needs to have a floor set by reference to the other wholesale prices, while seeking to enable eircom to recover its costs and providing entrants with sufficient incentives to invest. The 'economic space' is assessed with respect to all relevant active and passive wholesale inputs. The impact of specific assumptions depends on the specific cost elements associated with each incremental 'rung' on the ladder of investment. The main 'economic spaces' for which the margin squeeze test would apply across the supply chain are as follows:

– a retail margin squeeze test between retail stand-alone broadband and NGA Bitstream (and End-to-end Next Generation Bitstream, where it is provided);

– a wholesale margin squeeze test between End-to-end Next Generation Bitstream and NGA Bitstream;

– a wholesale margin squeeze test between NGA Bitstream and VUA;

– a wholesale margin squeeze test between VUA and SLU.

All of these tests are contained within Market 5. Table 3.3 below provides an assessment of the economic characteristic of the cost elements.

[29] It would seem advisable to assess whether eircom's concerns about vectoring are indeed appropriate.

Table 3.3 Economic space between main access products

Product increment	Relevant costs	Economic assessment
Bitstream (NGA Bitstream): retail	BRAS (for ATM bitstream), Authentication, Authorisation and Accounting Modem IP peering, marketing, billing Colocation (core/interconnect site), power Customer service, ancillary services (mail box, etc), triple-play content (IPTV)	Some costs scalable/fixed (customer acquisition, all of BRAS/AAA, part of IP peering) Some costs variable (modem, IP peering); installation costs need to be capitalised Factors largely replicable Content might be difficult to replicate, but anyone could do the rest. Unlikely to be able to shift high-quality content without reasonable control over underlying connectivity
VUA (connect at node): NGA Bitstream	Layer 2 (ATM, Ethernet, MPLS)/or Layer 3 (IP, MPLS) aggregation (backhaul) network BRAS (to equivalent of IP bitstream) Colocation (core site), power Faults & Maintenance	Partially scalable costs (capital expenditure—capacity of network dimensioned to catchment area). Cannot leverage beyond geographical footprint; may be possible to scale aggregation network to targeted exchanges Significant investment to replicate (aggregation network extends to aggregation point such as an exchange)
SLU: VUA	Street cabinet, DSLAM, MDF, power Layer 2 (ATM, Ethernet, MPLS)/or Layer 3 (IP, MPLS) aggregation network from street cabinet to aggregation point Colocation (aggregation point), power Faults & Maintenance	Partially scaleable because cabinet-based equipment will have a fixed number of lines per geographic area. Costs upfront and fixed Factors very difficult to replicate (cabinet → exchange link may require duct access/dark fibre. Any additional civil work likely to be costly. Prospects for SLU demand may be limited

Source: Oxera.

While the cost elements have been assessed in detail as part of the modelling phase of this project (TERA analysis), it is noted that the scalability of costs differs. This in turn has implications for the extent to which the assumptions on entrants' efficiency, and the cost standard used, matter.

OAOs' efficiency

In line with the definition in the European Commission's 'Notice on the applications of competition rules to access agreements',[30] the principal efficiency measures that could be applied in the context of margin squeeze assessments are as follows.

– The '**as-efficient operator**' or **EEO** test considers whether the incumbent operator's own retail arm would be able to trade profitably in the market if it had to rely on the profit margin given by the difference in the wholesale input prices charged to competitors and its own price charged in the retail market.

– The '**similarly efficient operator**' **(SEO)** test considers whether a 'similarly' efficient hypothetical competitor would be able to trade profitably if it had to rely on the profit margin given by the difference in the wholesale input prices of the incumbent and the incumbent's retail price. This test tends to be favourable for OAOs, given that an entrant would be expected to have the same cost curve but lower economies of scale than the incumbent.

[30] European Commission (1998), 'Notice on the application of the competition rules to access agreements in the telecoms sector', OJ 1998 C 265/2, paras 117–18.

The EEO approach requires data on eircom's costs and is based on eircom's scale of operations. In general, this approach leads to a smaller margin (or economic space) than the SEO approach, given the higher scale at which eircom operates relative to new entrants. As such, taking the retail price level as given (due to the pricing constraint), it leads to a higher maximum wholesale price than SEO, or a lower retail price than would prevail under the SEO approach. Furthermore, the EEO approach—typically applied in ex post antitrust assessments[31]—is more appropriate in the context of markets where there is a realistic prospect of future competition without the need for entry assistance, or evidence of significant actual competition in the provision of the wholesale service(s). In the context of ex post competition law, EEO is preferred also because it provides legal certainty and ability for the incumbent to determine the legality of its actions. The EEO test may also be more suitable where there are concerns about the investment and innovation incentives of the incumbent operator, or indeed its ability to compete. The EEO test could be applied if entrants to the Irish market exhibited economies of scale that were equal, or almost equal, to those of eircom; however, in an ex ante approach ComReg's choice is not restricted to EEO.

By contrast, an SEO approach in an ex ante context may be better suited to promoting competition and entry since it takes into account the lower scale, higher unit costs, etc, that potential entrants/competitors face. Although this approach could result in efficiency loss in the short term, if the benefits of entry and increased competition in the longer term are assumed to outweigh any efficiency costs from the hypothetical sub-scale or less efficient entrant, the SEO approach can be justified.[32]

As also argued by Ofcom, the SEO approach can be justified in the following case:

> the appropriate conceptual approach for the margin squeeze analysis in this situation would be to establish a margin which would allow a similarly efficient operator to enter the market today; to incur the relevant start-up costs, initial losses etc and still expect to be able to recover their costs over a reasonable period of time and to compete effectively with BT in the intermediate services market going forward.[33]

As noted in CRA's expert report justifying REO/SEO, not only does the current scale of competitors have to be considered, but also their likelihood of reaching efficient scale.[34] CRA argues that the fact that entrants are big international firms excludes the possibility of using this approach. However, in the Irish context the limited LLU take-up to date is indicative of sub-scale competitors; notwithstanding the financial resources and brand benefits of the multinational OAOs, they have relatively low volumes after being active in the Irish fixed market for several years. That said, the recent increased take-up of unbundling suggests that these firms might reach efficient scale in the future.

The design of the net revenue test, as discussed in a previous Oxera's report for ComReg in relation to eircom's bundles, is also relevant. As Oxera noted previously:

> ComReg could provide eircom with further pricing flexibility, should it be considered that the market conditions warrant such an adjustment.[35] Specifically, the price of WBA could be determined on an EEO (rather than SEO) basis when offered in a bundle that includes retail fixed narrowband access. Indeed, there would be some benefits in applying the EEO approach across the board.[36]

However, the following considerations seem necessary in the NGA context.

[31] For example, as stated in the Telefónica case (Case COMP/38.784).
[32] In relation to the current practice in Ireland, ComReg employs a combination of retail-minus tests applied in the regulation of SB-WLR and WBA. The former is an EEO test and the latter element—stand-alone broadband—is based on the SEO.
[33] Ofcom (2004), 'Direction: Setting the Margin between IPStream and ATM Interconnection Prices', August, p. 15.
[34] Walker (2011), op. cit.
[35] As identified by TERA, changing the assumption on an entrant's relative efficiency has a material impact on the pricing flexibility provided to eircom.
[36] Oxera (2011), 'Conceptual framework for the assessment of eircom's bundles: Adjustments to the net revenue test', September 30th.

– There are limited reasons to suggest that OAOs' competitive position would be substantially different in the context of NGA market relative to the current-generation broadband. As discussed in section 2 above, eircom's network upgrades are indeed a defensive response to UPC's high-speed offerings. Notwithstanding this, eircom's incentives to provide wholesale access to third parties on competitive terms may be equally limited, as they are currently. Therefore, the central underpinning of SEO test—ie, promoting competition—is equally valid in the context of NGAs. ComReg's market data indicates that Vodafone has been able to acquire market share that is broadly consistent with the scale assumptions embedded in ComReg's bitstream model, while other OAOs have not managed to acquire customers to a similar extent.[37] OAOs' market share in the Irish DSL market is lower than in many other Member States. These market dynamics can inform the design of the test, by indicating the entrant's actual scale and efficiency relative to the expectations underlying the pricing model for NGAs.

– Economies of scope relate closely to the cost standard employed in the test, while the assumption about an entrant's efficiency depends on whether it is considered reasonable to assume that an entrant can operate at the same scale (at the same point in the cost curve) as the incumbent (discussed below). There may be some cost advantages for operators in adjacent markets providing other communications services. In addition to mobile operators, certain OAOs' ability to bundle their TV offerings has been considered relevant in the context of NGA competition. These operators may indeed benefit from *scope* economies (ie, their unit costs of providing bundles are lower since they exhibit cost advantages from providing other related products). However, the unit costs of the provision of broadband services—whether NGA or legacy—depend also on the scale of the connections used.

The principles on the assumption about an OAO's efficiency should be consistent throughout the supply chain—ie, between retail and bitstream offers, and between various wholesale inputs. However, it may not be reasonable to derive the economic space on the basis of an SEO test if there is no realistic prospect of any significant provision of an alternative wholesale input further upstream. For example, insofar as there is no business case for OAOs to build out their own fibre networks to cabinets (and to purchase SLU from eircom) it would not seem reasonable to provide 'entry assistance' through an SEO-based economic space between VUA/LLU and SLU.

In conclusion, the choice between the EEO and the SEO approach mainly depends on the competitive position of the entrants/competitors. Employing an SEO approach (initially) assumes that the OAOs will indeed reach sufficient scale, and that the increased level of competition ultimately benefits consumers. In order to provide the OAOs with the right incentives, ComReg may consider it appropriate to:

– determine a threshold (in terms of OAO market share) after which the test would be undertaken on the basis of EEO;

or

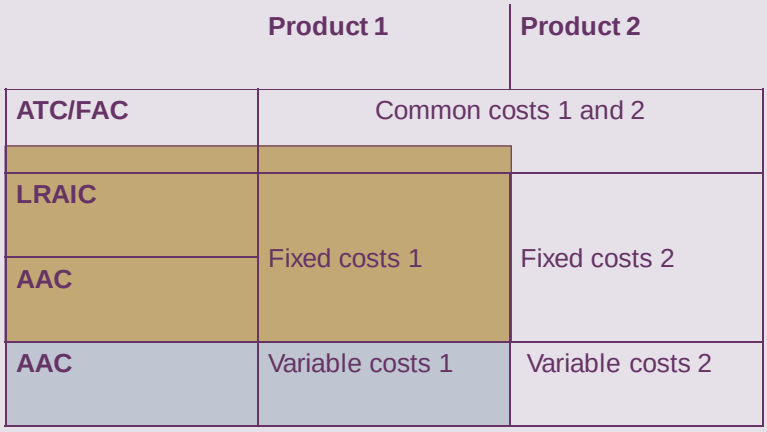
– apply a 'glidepath' whereby the economic space gradually moves from SEO to EEO over a predefined time period (eg, three years).

Cost standard

The cost standard applied in the margin squeeze derivation seeks to enable new entrants to recover their fixed and common costs of entry and to provide the right signals for their investment decision on whether to move up the ladder of investment. The gradual inclusion of different types of cost is illustrated in Box 3.3.

[37] ComReg (2011), 'Quarterly Key Data Report—Data as of Q1 2011', June 21st, p. 39.

Box 3.3 Cost standard variants



Source: Oxera.

– Average variable costs (AVC)—costs that vary with output. These usually refer to small, short-term output changes.

– Average avoidable costs (AAC)—costs that can be avoided if production of a given increment (eg, a product) ceases. AAC may include a proportion of fixed costs if the increment is large and the time horizon long.

– LRAIC(+)—costs that can be avoided in the long run if the provision of a given increment (eg, a product) ceases. These include all fixed costs of the increment, and might include some common costs if these would be avoided in the long run were the increment no longer to be produced.

– Average total costs—similar to fully allocated costs (FAC), these would cover LRAIC plus a larger proportion of common costs allocated to the product in question.

The implications of applying these cost standards in the margin squeeze test are summarised as follows:

– ATC is a measure of average cost and takes into account all costs, not only those incurred to provide the service in question. Conceptually, ATC will vary depending on whether it is measured against all output, or only the 'contestable' units. Nevertheless, employing ATC can be warranted if entry assistance has relevance. The economic rationale of using ATC builds on an OAO's potentially limited ability to compete primarily because it is constrained in terms of its economies of scope relative to eircom. Put another way, this approach can implicitly take into account that an OAO has to incur certain costs that the incumbent does not.

– LRAIC, as defined by ComReg, covers the average efficiently incurred variable and fixed costs that are directly attributable to the activity concerned over the long run, excluding the common costs. A cost standard that incorporates an (appropriate) allocation of common costs is referred to as LRAIC+. In other words, some common costs are included if these would be avoided in the long run were the increment no longer to be produced (as illustrated in the above figure). This means that all fixed and common cost elements that can be directly linked to the service in question are taken into account, but that other costs of a multi-product firm that would be incurred irrespective of providing the relevant service are not.

The telecoms industry is characterised by economies of scope. Thus, the exclusion of common costs from the margin calculation could imply that OAOs would be at a disadvantage to the incumbent, insofar as OAOs do not benefit from economies of scope to a similar extent. The relevant cost standard should be chosen according to whether the

concern is the future exclusion (or exit) of current efficient competitors or the deterrence of efficient entrants. The former would suggest that the AAC of the competitor could be applied since avoidable costs are the relevant measure when firms are assessing whether to stay in the market. On the other hand, the use of LRAIC+ (or ATC) would be consistent with the objective to promote entry, since it takes into account all incremental costs of starting to provide a service, and includes a mark-up for relevant common costs.

In its decision on *Telefónica*, the European Commission also argues for LRAIC in the context of margin squeeze in the telecoms sector:

> Therefore, in accordance with the economic theory and with the practice of the Commission on margin squeeze where the ability of competitors to operate profitably in the long term was assessed, the relevant cost measure for the assessment of a margin squeeze in the telecommunications sector is the long run average incremental costs (LRAIC)[38]

and, separately:

> In the case of multiple products, any costs that could have been avoided by not producing a particular product or range are not considered to be common costs. In situations where common costs are significant, they may have to be taken into account when assessing the ability to foreclose equally efficient competitors.[39]

Thus, a lighter regulatory stance might be appropriate where competition has evolved, and an approach analogous to competition law (LRAIC) might be warranted for individual products:

– while ensuring full cost recovery, LRAIC, as the minimum economic space, would enable more scope for reducing retail prices (for any level of wholesale prices), which may be necessary given the competitive constraints from facilities-based competition (cable, LLU);

– when migrating to VUA, entrants *may* already have a substantial customer base, and therefore a similar type of entry assistance in the form of a different cost standard (eg, LRAIC+ or ATC) is less grounded.

As noted above, there are reasons to apply a less stringent cost standard with respect to individual products as long as the recovery of all relevant common costs over a broader portfolio is ensured. However, given that the proposed portfolio includes a broad set of products, and it may not be realistic to expect all entrants to be able to provide a similar variety of services, ComReg may wish to consider incorporating certain common costs in the cost base applied for individual broadband products.

Level of aggregation

Oxera's report on the application of the net revenue test in the context of bundled products sets out the advantages and disadvantages of testing margin squeeze on a product-by-product basis relative to conducting the test using a wider portfolio of products. While recognising that the product-by-product test may have some advantageous properties in terms of promoting competition, Oxera concluded that, under market conditions where there is already some competition, it might not be reasonable to test for margin squeeze for every individual product specification—bandwidth class, in this context. In summary, the principal merits of applying the test to a wider range of products are as follows:

– a welfare-maximising pricing structure of a multi-product firm with market power is one where common costs are recovered such that there is an inverse relationship between

[38] European Commission, Case COMP/38.784, para 318.
[39] European Commission (2008), 'Guidance on the Commission's enforcement priorities in applying Article 82 of the EC Treaty to abusive exclusionary conduct by dominant undertakings'.

prices and elasticities of demand. This would suggest that, as long as the overall portfolio passes the net revenue test, the portfolio approach would be beneficial for consumer welfare;

– as an entrant gains market shares, its decision-making process entails an assessment of the profitability of its investment across its entire product range offering in the market, which suggests that the portfolio test should be applied.

Given this, the use of a combinatorial test that ensures the recovery of the total costs by the entire portfolio of broadband products (ATC) could provide eircom with sufficient pricing flexibility without distorting entry conditions. The question that follows is how the portfolios are defined. Box 3.4 sheds light on the principles and approaches that could be recommendable in the context of broadband products.

Box 3.4 Aggregation: discretion for recovery of common costs

Aggregation across products

The definition of portfolios should recognise the demand and supply conditions of individual broadband offers, and the grouping should be done by identifying those broadband offers that are considered closely substitutable (in effect, the sub-markets of Market 5).

Practical approaches seem reasonable, while recognising the following attributes would be informative:

– **demand side**: consumers consider broadband offers (different bandwidths) included in the portfolio to be relatively close substitutes (or there is a realistic prospect of a chain of substitution);

– **supply side**: offers included in the portfolio are such that the operators can switch to provide any of the bandwidth classes within the portfolio without incurring significant costs (eg, the broadband offers would not rely on different infrastructure and/or wholesale inputs).

In terms of striking a balance between practicality and economic reasoning, supply-side factors are more relevant in this context. This is because there are differences in the interface and pricing of bitstream services over eircom's NGA area.

3.4 Recommendations on assumptions where the margin squeeze test would be warranted

In summary, it would seem advisable to employ the following assumptions when using the margin squeeze test in the context of NGA:

– a LRAIC(plus) cost standard for individual broadband products if ComReg considers that competition is sufficiently evolved, as manifested by OAOs having sufficient scale (or at least a prospect of achieving this). Otherwise, ATC could be applied for individual products, as is the case in the retail-level test on current-generation broadband (using the discounted cash-flow model as defined in ComReg's decision D01/06). While entry-assisting, if ATC is applied in the margin squeeze test, it would be appropriate to specify in advance that a less stringent cost standard could be introduced as soon as OAOs have sufficient economies of scope in the market;[40]
– portfolio-level test ensuring that the ATC of the entire portfolio are recovered;
– SEO, with a predefined market share threshold or time after which EEO would be introduced.

The implementation in the context of the transition period is discussed further in section 6.

[40] It is Oxera's understanding that, in this context, the difference between LRAIC+ and ATC may be limited.

3.5 Assumptions underlying the cost-plus approach

While the construction of the cost model (if considered appropriate) is outside the scope of this report, some important economic considerations would need to be examined fully before the model can be constructed and implemented. Indeed, the principles are determined in this report regardless of whether ComReg considers the margin squeeze test or a cost-plus approach to be more appropriate in the current context. The cost-plus approach could become relevant:

- in areas where there is no retail pricing constraint (ie, no cable or LLU-based competition), cost-plus regulation may be appropriate once demand and cost conditions become more certain (see discussion above);
- for non-replicable passive access products for which there is no corresponding retail service (eg, ducts); and/or
- where eircom deploys point-to-point FTTH, which can be physically unbundled. Similarly to LLU in the context of current generation broadband, FTTH unbundling could represent an option to achieve active access to the ladder of investment.

Broadly, three categories of assumptions significantly influence both the practical implementation of the cost model and the resulting price ceiling derived by the model: a bottom-up versus top-down approach; asset valuation based on historical-cost accounting (HCA) rather than current-cost accounting (CCA); and the cost allocation standard employed.

3.5.1 Bottom-up versus top-down

With regard to the applicability of bottom-up and top-down models, Table 3.4 gives a high-level summary.

Table 3.4 Bottom-up versus top-down models

	Bottom-up	Top-down
Advantages	Mimics competitive market outcomes by assuming costs that an efficient entrant would face Transparency—does not rely on commercially sensitive (actual) cost data	Likely to ensure cost recovery May be quicker and less costly to implement, although this depends on how well categories in the financial accounts match the data required
Disadvantages	Risk of over- and under-recovery, given uncertainties in modelling The modelling process can be time-consuming and expensive Also implies that assets are valued as new (as opposed to partially depreciated), which may not be appropriate	May incorporate inefficiently incurred costs that would not occur in a competitive environment Confidentiality—other stakeholders may not have access to the information used

Source: Oxera.

There are challenges that are relevant to both these approaches. For example, in practice, cost allocations can be subjective and many cost accounting systems lack transparency.

The fact that NGA assets are newly deployed has implications for the choice of modelling approach. Notably, there are reasons to suggest that the new networks are constructed efficiently given the increasing competitive pressure, especially in the areas where NGAs are likely to be built. This would suggest that constructing a bottom-up cost model would result in a disproportionate regulatory burden and unnecessary uncertainty.

3.5.2 Asset valuation/accounting principle

The approach to asset valuation depends on the replicability of the asset in question. Where cost-plus regulation is relevant, the approach should recognise whether it is

appropriate to assume that an OAO (who buys wholesale services using these assets) would be in a position to replicate the asset or the service provided over that asset. Put another way, the central rationale of employing cost models where assets are valued at their current replacement costs (CCA) has been to provide the existing and potential competitors with the right 'make/or buy' signals.

However, should there be no evidence that the assets could indeed be replicated, alternative valuation approaches could be adopted—using approaches such as HCA could be more appropriate for assets such as ducts, which are unlikely to be replicated.

The European Commission's consultation document states that:

> some NRAs recognize that those assets which cannot be economically replaced (such as for example ducts) must not necessarily be valued at their full replacement costs[41]

According to the Commission, replicability of legacy network elements might vary among Member States and should be determined according to an assessment of 'technological change, retail demand and the state of competition over a sufficiently long time horizon'.[42] It is considered that non-replicable assets may be valued according to HCA and replicable assets according to CCA. The CCA can be justified for the new investment in active electronics, and potentially for the fibre links, although the fibre network still uses some parts of the same civil infrastructure used by copper (and, in the case of FTTC, some parts of the copper network itself). Caution should be exercised before revaluing assets based on their replicability. Consistent with the principle of technological neutrality, insofar as there is a realistic prospect that the relevant services could be provided over the same *or* an alternative technology (eg, wireless), assets may become replicable even if they are not so at the moment.

The key access network assets can be categorised in terms of their replicability, as summarised in Table 3.5.

Table 3.5 Replicability of access network assets and potential approaches to asset valuation

Asset	Replicability	Potential costing approach
Duct	Non-replicable	HCA/renewals accounting
Copper loop (D and E-side)	Partly stranded	HCA or CCA
Active access electronics	Replicable	CCA
Fibre loop	Non-replicable	CCA/Rolling forward RAB

Source: Oxera; Frontier Economics (2011), 'Access network costing', A report prepared for the Vodafone Group, June.

Where cost-based regulation is applied, caution is necessary if certain assets are to be revalued. Regulatory asset valuation may have broader implications for the market value of the regulated company, as perceived by financial investors. Furthermore, revaluation of assets—and the potential consequent implicit writing-off of the remaining value of past investments—could distort future investments, and be inconsistent with the objective to provide regulatory certainty over time.

[41] European Commission DG for Information Society and Media (2011), 'Questionnaire for the public consultation on the costing methodologies for key wholesale access prices in electronic communications', October 3rd. See http://ec.europa.eu/information_society/policy/ecomm/doc/library/public_consult/cost_accounting/costing_methods_questionnaire.pdf.

[42] Ibid, p. 7.

3.5.3 Cost standard for cost-plus

The regulatory cost standard—and hence the cost allocation principle—warrants careful consideration both where a cost-plus approach is employed and similarly in the assessment of the sufficient economic space between retail and wholesale prices, and between the prices of different wholesale inputs (as discussed above). The gradual inclusion of different types of cost was illustrated in Box 3.3 above.

With respect to the choice of cost standard, it would seem essential to establish how eircom does (and could) recover its common costs most efficiently. Put differently, there are significant common costs across services which should not be 'double-recovered'. Hence the application of cost standards such as FAC and ATC would need to ensure that the common costs are not already recovered through some other services. Conceptually, the regulatory design could take into account the Ramsey pricing principle, whereby a larger proportion of common costs would be recovered through less price-elastic services, although the practical application of such techniques has proven complex, if not impossible in practice. Nevertheless, such principles could inform the choice of cost standards insofar as there is evidence suggesting that this choice could enable and incentivise more efficient recovery of common costs across services.

Where cost-plus regulation is applied in the context of access inputs, the cost standard should incorporate at least the relevant incremental costs of providing the service (including a contribution to fixed, and possibly some common, costs). In this respect, cost standards such as LRIC or LRAIC(+) would seem conceptually appropriate and consistent with regulatory best practice, although the specific prices derived with these standards depend on their design.

3.5.4 Cost recovery under uncertainty

Conceptually, the appropriate compensation required by investors consists of the return *of* capital and the return *on* capital. The first component is required for investors to expect to break even on average; the second (discussed below) compensates investors for bearing risk in addition to the recovery of the original investment.[43]

In such a scenario, the regulation should allow eircom a higher price in the upside scenario to compensate for the lower achievable price in the downside scenario. This is particularly relevant in the case of NGA investments due to the considerable demand risk. When setting the allowed price, the full demand curve needs to be considered for each scenario. More specifically, the distinction between cost recovery and allowed returns has a number of implications for the design of a 'cost-plus' price control. A distinction may need to be made between the FTTC investments (which rely strongly on the existing copper access infrastructure) and the FTTH investments, which, in turn, exhibit significantly higher upfront CAPEX requirements and whose cost recovery is more uncertain. Indeed, FTTC could be considered as an upgrade of the existing network without which eircom would risk losing its existing customers to UPC, and hence the cost recovery of some of its underlying legacy assets as well.

– The allowed price should be sufficient for investors to expect to recover their original investment. The allowed return is a compensation for risks and should be provided over and above the recovery of the original investment.

– When setting the allowed price, it is important to take into account the downside scenario. This means that the probability of the downside scenario occurring, as well as the level of demand were it to occur, needs to be robustly estimated. It is noted that, with respect to the current (predominantly) FTTC investments, eircom's investments could be

[43] For further discussion, see Oxera (2008), 'Dealing with uncertainty: how to encourage investment in NGA networks?', *Agenda*, December, available at www.oxera.com.

considered as defensive, rather than 'Greenfield' investments with considerable risk of downside.

– If the upside volume scenario occurs, actual recovery would exceed the original investment. Similarly, if the downside scenario occurs, investors would under-recover. Thus, if no protection is offered in the downside, there should be no automatic control of prices so as to cap the achievable return to the cost of capital. If this happens, the *average* return to investors at the time when the investment is committed is below the cost of capital.

– At the time of the investment, investors assume risks over the lifetime of the assets. Therefore, it is not appropriate to revise the allowed price downwards over the lifetime of the initial investment on the grounds that the level of risk decreases (eg, due to less uncertainty with respect to demand).

These considerations highlight the challenges of introducing cost-plus regulation for new NGA services.

3.5.5 Cost of capital for NGAs—is revision of the current fixed-line weighted average cost of capital needed?

Where a cost-plus approach to setting wholesale prices is required, and these wholesale services are provided from a significant capital base, the cost of capital will be a significant determinate of the appropriate regulated price. However, where the retail prices are already constrained by alternative, unregulated, competitors, a change in the cost of capital for the incumbent may not affect the level of retail prices that are competitive. Under these circumstances, changes to the cost of capital may influence the *maximum* prices that would be allowable, but not the prices that are achievable if the required economic space is to be maintained between different wholesale prices and retail prices.

Should there be a concern regarding wholesale prices that are too low (eg, a risk of predatory prices), any change in the cost of capital would again be relevant.

Given the recent changes in both the European economy in general and the Irish economy in particular, the regulatory cost of capital currently applied for the Irish fixed-line business may warrant a review at some stage. There have been changes in the capital markets since the current regulatory weighted average cost of capital (WACC) was introduced in November 2007. Furthermore, it has been suggested that the WACC needs to reflect (potentially) higher risks associated with the new networks. Indeed, in line with the principles set out in the European Commission's 2007 Recommendation on NGA,[44] ComReg may wish to consider the possibility of applying a risk premium to the cost of capital to reward investors for the demand- and supply-side uncertainty associated with NGA investments.[45] Again, however, it is noted that the regulatory WACC is relevant in the context of (i) cost-based pricing; (ii) margin squeeze test pricing and the calculation of the economic space insofar as this involves CAPEX; and (iii) (as indicated by eircom), if the investment in NGAs has implications for eircom's risk at the firm level, rather than only with respect to certain next - generation assets.[46]

A further relevant consideration is that the currently applied WACC pertains to the fixed-line business (ie, an industry WACC applied to eircom) without making a distinction between the network and retail activities. Insofar as the retail business exhibits higher risks (in terms of exposure to economic fluctuations), the 'overall WACC' could over-, rather than

[44] European Commission (2007), 'Commission Recommendation on relevant product and service markets within the electronic communications sector susceptible to ex ante regulation in accordance with Directive 2002/21/EC of the European Parliament and of the Council on a common regulatory framework for electronic communications networks and services'.
[45] European Commission (2008), 'Commission Staff Working Document Explanatory Note', accompanying document to European Commission (2008), 'Commission recommendation of […] on regulated access to Next Generation Access Networks (NGA)'.
[46] eircom's response to Oxera's questionnaire.

underestimate the WACC that is relevant for price regulation in this context. It is also noted that eircom's investments are mainly FTTC, which, while somewhat significant in scale, do not represent a fundamental change of the entire access network; rather, these are considered as necessary upgrades to maintain existing customers on eircom's platform.

On balance, given the limited relevance of a WACC revision in the current context, it may not be proportional to undertake a detailed assessment at this stage. Nevertheless, should ComReg consider a potential review at a later stage, Box 3.5 outlines factors that would appear to warrant consideration.

Box 3.5 Factors to consider when reviewing the regulatory WACC

The most recent decision on the cost of capital of eircom's fixed-line regulated business took place in November 2007 prior to the financial crisis. Since then, there has been a severe downturn in the Irish economy, which has led to annual GDP contracting by 7.1% in 2009 and by a further 0.1% in 2010.[47] This downturn is likely to have implications for investors' perceptions of eircom's risks and the company's financing costs.

– The severity of the economic downturn in Ireland led to Moody's lowering its sovereign credit rating for Ireland to Ba1 from Baa3 on July 12th 2011, reflecting the deterioration in the country's public finances and relatively poor economic prospects. As sovereign risk would be expected to affect eircom's creditworthiness as well as the conditions under which it can raise finance, its implications for eircom's cost of capital (including both the cost of debt and equity) could be considered.
– The severe downturn has led to nominal yields on Irish government bonds increasing from around 4.5% in July 2007 to over 8% at present. There is evidence that lower sovereign ratings lead to higher expected equity returns and that investors are pricing sovereign risk into their cost of debt. This suggests that it would be important to reassess the 2007 estimates of eircom's cost of equity and debt, and in particular, the approach used to estimate the risk-free rate and the equity risk premium.
– In addition to considering the implications of sovereign risk for the cost of equity and debt, sovereign risk is likely to have a demonstrable impact on the perceived creditworthiness of Irish companies, and the conditions under which they can raise finance.

In addition, it may be important to reassess the adopted assumptions for eircom's beta. Although ComReg's 2007 estimate of the asset beta for eircom's fixed-line services (of 0.57) is not out of line with Ofcom's assumptions on the beta in its recent decision on BT as part of the WBA charge control, it would be important to reassess whether changes in eircom's business profile have led to a significant difference in the risks faced by investors in eircom.[48]

Risk differentials between new NGA-specific CAPEX and the rest of eircom

At the time of the 2008 decision, ComReg did not apply an uplift to the cost of capital for new NGA/NGN-specific CAPEX, owing to a lack of robust evidence on the existence of risk differentials between NGN/NGA and the rest of eircom's regulated assets, as well as the uncertainty around the potential CAPEX programme in NGN/NGAs.[49] However, ComReg acknowledged that this could be reassessed in light of any new substantial information being submitted.

To assess risk differentials, a number of metrics could be considered, including measures of CAPEX intensity (eg, CAPEX relative to fixed assets) and operational gearing. To the extent that NGA roll-out requires increased CAPEX, eircom's CAPEX intensity would be expected to increase. There is evidence that higher CAPEX intensity leads to a higher beta.[50] Furthermore, the NGA investments are characterised by a degree of demand uncertainty, which may, however, be diluted insofar as the investments are more network upgrades than investments in completely new services and defensive competitive investments to match the service quality provided over UPC's network. (Indeed, there are circumstances under which it is more risky *not* to invest).

[47] Bergin, A., Conefrey, T., FitzGerald, J. and Kearney, I. (2010), 'Recovery Scenarios for Ireland, An Update', *The Economic and Social Research Institute*, Quarterly Economic Commentary.
[48] Ofcom (2011), 'WBA Charge Control, Charge Control Framework for WBA Market 1 Services', July 20th.
[49] ComReg (2008), 'eircom's cost of capital', Response to Consultation and Decision Notice, May 22nd, p. 3.
[50] Sugarcane, P.S. (1992), 'Market and Industry Structure and Corporate Cost of Capital', *The Journal of Industrial Economics*, June.

While there are reasons to suggest that fibre investments could warrant a 'risk premium' reflected in the regulatory cost of capital, the extent of such an uplift is an empirical question. For example, to the extent that such investments are comparable to Greenfield investments, the returns required by investors on these investments could be examined. The targeted returns could be compared with the cost of capital determined for eircom. An alternative approach would be to estimate a separate cost of capital for eircom's new and existing assets. However, it is understood that this was ruled out by ComReg in the last review on the basis of the data supplied by eircom, which indicated that risks associated with eircom's new investments were not likely to differ from those faced by its existing investments.[51]

3.6 Recommendations on assumptions where cost-plus would be warranted

Cost-plus is appropriate where demand and costs are predictable, and, critically, where there are no significant pricing constraints. If such constraints exist, the standard approaches of cost orientation are not as relevant as they would be in the context of monopoly regulation. It is recognised that eircom has SMP, and hence the retail pricing constraint may not fully undermine the relevance of the cost-orientation remedy.

In commercially viable areas where eircom has rolled out NGA, but UPC is not present, cost-plus regulation may be more appropriate (cost-plus implies *maximum* prices, which may not bind). For the time being, however, it would seem appropriate to apply the margin squeeze test throughout, given that it may not be proportional to introduce different regulatory approaches to what seem to be limited geographic areas.

Where and when the cost-plus approach is introduced, the following assumptions seem reasonable and consistent with both economics and regulatory best practice.

– **Asset valuation**—the 'replicability 'criterion' would suggest that the new NGA assets could be valued on the basis of replacement cost. This is consistent with the principles that access prices should provide the right 'make/or buy' signals to the market and that new assets, which have the potential to be replicated, should be valued at replacement costs. However, it is noted that the difference between valuation methodologies may be limited, given that the assets are new (ie, their book value is likely to be close to their replacement cost). Moreover, the depreciation profile is likely to be of importance—economic depreciation would take into account the (forecast) utilisation profile and render a price path that is not disproportionately high in the early years of take-up.

– **Cost standard**—LRIC(+) would be an appropriate cost basis, given that it incorporates fixed costs but does not allow *over*-recovery of common costs. Insofar as *some* common costs would be recovered through access charges, it would be necessary to ensure that these same costs are not recouped elsewhere.

– **Cost recovery under uncertainty**—where the cost-plus approach is employed, it would need to ensure consistency over time. Indeed, a particular challenge is to prevent revision to the allowed return midway through the lifetime of the investment.

– **A top-down approach to modelling** would be appropriate in the context of relatively new networks. Given that eircom is under competitive pressure, it would seem reasonable to assume that the new network is efficiently deployed. Consequently, it would not appear sensible or proportionate to construct a network model bottom-up for a 'hypothetical' efficient entrant.

[51] ComReg (2008), 'eircom's cost of capital', Response to Consultation and Decision Notice, May 22nd, p. 22.

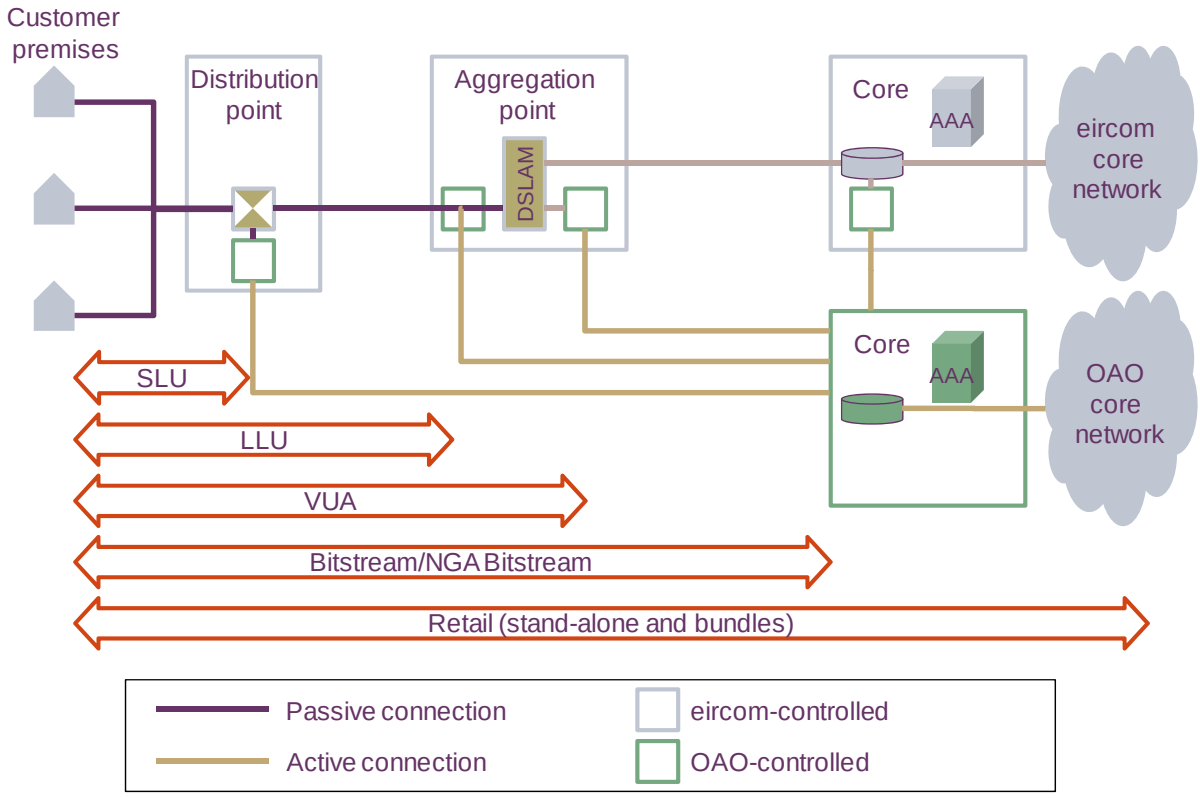
– **Cost of capital**—the WACC applied by ComReg may need to be reviewed at some point in the future, but the current WACC is likely to be appropriate in the current context.

4 Product characteristics and pricing of new services

4.1 Economic characteristics and pricing structures of NGA products

The ability of OAOs to offer differentiated and tailored retail services is an important driver of downstream competition in the broadband market. This includes the ability to specify the technical parameters of the service (bandwidth, contention ratio, traffic prioritisation and customer premises equipment) and the ability to create as appealing a price structure as possible. Figure 4.1 illustrates how the main wholesale services are provided along the access network.

Figure 4.1 eircom's envisaged wholesale services during transition



Source: Oxera based on eircom's public materials.

In the NGA context, a varied retail price scheme may cater equally to 'high-usage' consumers who take advantage of higher the download speeds that NGA offers and 'legacy-usage' consumers who do not have the same willingness to pay.

The principal economic characteristics of these products are summarised as follows.

– In the context of bitstream services (and, more specifically, NGA Bitstream and VUA), an access seeker is likely to be constrained in the flexibility of its retail pricing by the pricing structure of wholesale access. Typical bitstream pricing structures consist of relatively low fixed costs (for the aggregate interconnection link, maintenance) and a relatively high variable cost per customer (a per-line access charge).

– By contrast, LLU pricing structures typically involve a high fixed cost associated with entry (rack, colocation, site surveys, power at each LLU site) and a lower marginal cost

for each customer served from that exchange (the per-line access charge). This can be seen as a risk transfer to the entrant, and a movement up the ladder of investment. Entrants in the bitstream setting with low fixed cost of access and high marginal costs (line access) have fewer opportunities to reduce retail prices, since setting prices below marginal costs results in a marginal loss even in the long term. A price structure with a lower marginal cost of line access permits more freedom in retail pricing, and could allow entrants to move up the value chain more easily. This could be particularly relevant in the face of demand uncertainties, or for the expected rich variety of applications that NGA may permit.

In principle, moving bitstream (or NGA Bitstream provided over NGA) pricing structures to a higher fixed component (lower per-line charge) will involve matching the wholesale costs to prices at a level of granularity that moves up the value chain closer to the raw inputs of service provision. In practice, this means shifting some of the marginal line costs (such as active equipment) into a category of fixed costs, some of which could be paid in a recurring manner rather than upfront. Costs that are common (such as operations and maintenance) could be recovered by an uplift on the fixed charge components.

Box 4.1 summarises some of the OAOs' views on products and pricing, based on submissions to ComReg's consultation.

Box 4.1 Summary OAOs' views on access products

✂

✂

4.1.1 Risk-sharing pricing structures

Oxera understands that the standard price plan for the NGA Bitstream and VUA products could be similar in principle to that of legacy WBA products, whereby entrants pay most of the access charge via a per-line monthly fee. However, VUA offers the potential to emulate some of the economics of LLU price structures.[52] Unlike traditional bitstream, VUA offers the entrant the ability to connect to the access network at the local exchange level and serve all customers within the incumbent's aggregation area. In addition to the entrant providing its own backhaul from the exchange, this allows pricing structures that mimic more closely the roll-out of the underlying physical network, by pricing a cost for connection to each additional geographical area (ie, equivalent to the local exchange areas). Costs that were once not

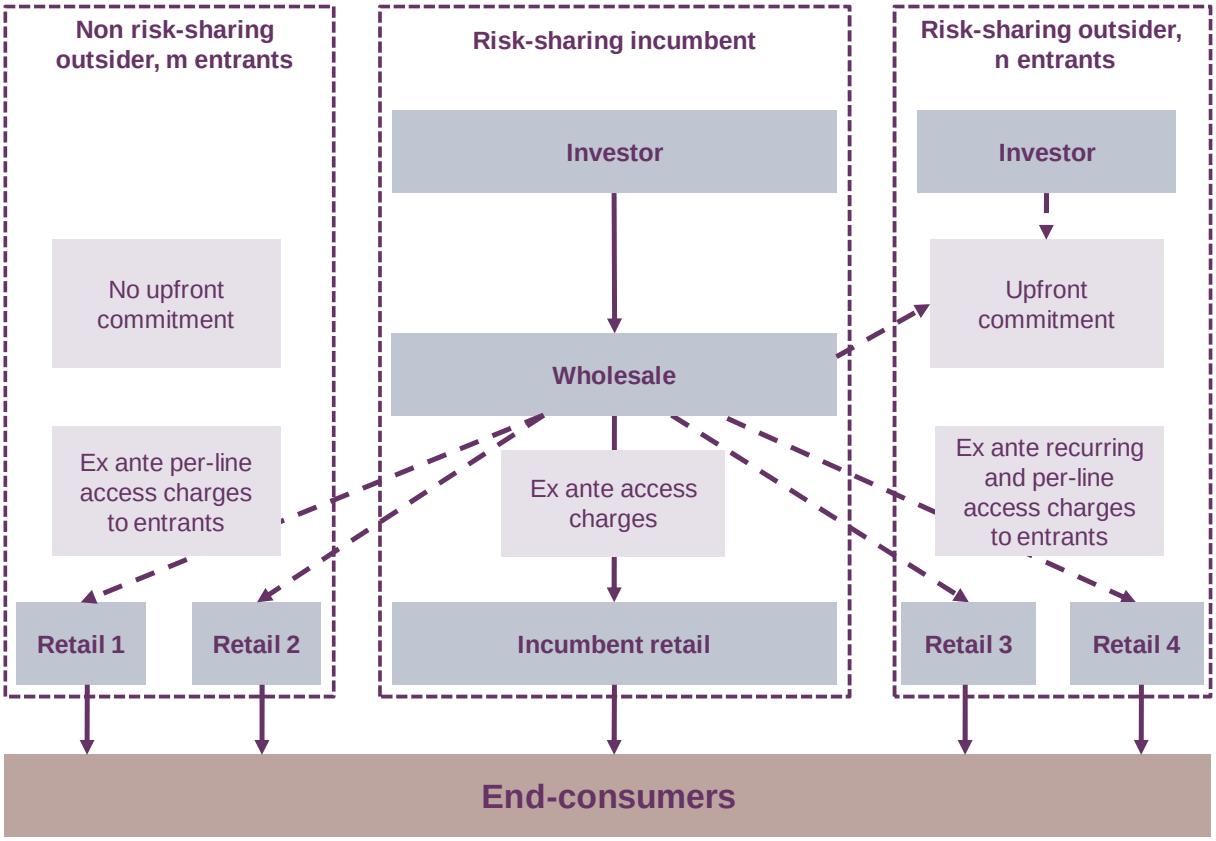
[52] NGA Bitstream is expected to be similar to the current bitstream offerings in terms of the pricing and investments required by OAOs—hence VUA, which exhibits different characteristics, is examined here.

transparent in the per-line rental charge, such as additional backhaul bandwidth, can now be obtained or self-supplied by the OAO as needs dictate. Specific services such as authentication and authorisation are operated by the entrant, so these fixed costs will factor in the entrant's fixed-cost stack.

eircom's proposal for risk-sharing includes an option to shift the profile of charges towards a higher proportion of upfront costs and may be relevant not only for VUA, but also for other (NGA) wholesale services. For the incumbent, a main attraction of a price plan with a higher upfront component is sharing the risk that stems from the cash-flow profile, as some of the NGA demand uncertainties will be shared by the entrant, insofar as OAOs commit upfront to certain purchases of capacity. The upfront fixed cost in a risk-sharing price structure will represent a commitment to the incumbent over time to a bounded level of capacity (ie, customer access lines). A stylised model of the broadband industry in Figure 4.2 illustrates the risk transfer between investors, industry players and consumers. The supply chain is depicted vertically and the players arranged horizontally, with the incumbent in the middle.

The lines show the transfer risk of a proposed NGA investment; in the box on the left are bitstream access seekers and to the right are 'risk-sharing' access seekers. For the incumbent, the investors provide the capital required to build the network, but also receive the upfront commitment from the OAOs. In return for recurring cash flows, the wholesale units provide access to the retail units of the vertically integrated firm and from bitstream and VUA entrants. Retail units compete in the final stage for customers, although on the basis of the relevant infrastructure (bitstream and VUA). The final transfer of risk is to end-users, who provide monthly cash flows.

Figure 4.2 Risk-sharing models



Source: Oxera; Nitsche, R. and Wiethaus, L. (2010), 'NGA: Access Regulation, Investment, and Welfare A Model Based Comparative Analysis', ESMT White Paper.

As part of the cost recovery is front-loaded, this may provide a rationale for a lower cost of capital. The incumbent will relinquish some of its control on the entrant in retail pricing compared with the high per-line cost of the status quo.

For the entrant, the high fixed-component pricing plan may assist it in achieving economies of scale that are not available with high per-line charges. Entrants could target higher-density urban exchanges first to achieve some benefits similar to those that LLU operators have obtained.

In addition to the potential for pricing flexibility, a low per-line charge may have other regulatory benefits. These fixed and recurring costs of risk-sharing price structures could be designed to reflect more closely the provision of the raw inputs required for wholesale broadband,[53] although even under this pricing structure, the risk of over- or under-recovery would be present.

There are potential welfare benefits of a pricing structure that shares the risks of NGA deployment at the time of the investment. A risk-sharing pricing structure with high upfront costs exposes the entrant to some of the NGA demand risk. If NGA is a success, the entrant would exceed its capacity commitment level and the investment would be recovered via the upfront and recurring charges.[54] Downstream competition is likely to be more intense (relative to the bitstream status quo), as the risk-sharing entrant gains pricing flexibility with each additional line served. In the downside, the entrant would not achieve its line capacity commitment, but the investment would be partially recovered via the upfront costs. The implication for downstream competition is that risk-sharing entrants would not reach sufficient scale. They could exit the market or reconfigure operations in subsequent periods to provide services using regular bitstream.

This risk-sharing arrangement has an interaction with the incumbent's initial investment decision. Lowering the overall risk by sharing the demand uncertainty with the entrant may mean that a larger NGA deployment is possible, although incumbents could be deterred by the prospect of increased downstream competition. The entrants' investment incentives are also altered: an upfront commitment deters a subsequent investment in self-build or alternative infrastructure.

Note that the risk-sharing framework (as envisaged by eircom) is not similarly applicable when the network has already been deployed, with the investment sunk. In other words, a distinction should be made between pricing structures that benefit the incumbent in terms of cash flows upfront, and a form of co-investment whereby operators share the cost of investment and are entitled to the returns generated by the network operator.[55]

4.1.2 Regulatory considerations of risk-sharing pricing models

A price structure that shifts towards lower per-line charges will have some regulatory implications. Higher upfront costs might be a barrier to market entry at the detriment of downstream competition. The risk-sharing pricing scheme also presents some challenges to implementation, as follows.

– OAOs will require the scheme to represent a positive net present value compared with a model where 'linear' monthly charges are paid. In general, the demand uncertainty of NGA products may be a limiting factor to an entrant's investment decision. More specifically, the price plan will need to make some realistic assumptions about the scale that entrants might achieve. If some semi-fixed costs are now recovered through higher

[53] Towerhouse Consulting (2011), 'Wholesale pricing for next generation access networks', report for Vodafone.
54 Nitsche, R. and Wiethaus, L. (2010), 'NGA: Access Regulation, Investment, and Welfare A Model Based Comparative Analysis', ESMT White Paper.
[55] This form of co-investment is discussed in detail in Oxera (2011), 'How a co-investment model could boost investments in NGA networks: Feasibility and implementation of a co-investment model', November.

fixed charges, the level at which the fixed component is set will imply the attainment of a certain scale in terms of access lines within the VUA aggregation zone;

– implementation of a higher upfront price structure will also need to be consistent with a margin squeeze test framework of price control, which is typically implemented as monthly variable charges.

A possible solution to these challenges is a DCF approach to price-setting. This would require some assumptions about the number of lines that an entrant could acquire and the time period to be covered by recurring and upfront charges. This would address the scale issue and could allow the value of charges to be made equal to the net present value of the margin squeeze test.

A pricing structure with a high upfront fee necessitates an approach where revenues and costs are projected over time (and/or assessed retrospectively). To this end, a DCF model could be employed, including assumptions and information on:

– the timeframe of upfront charges (covering the construction risk and demand risk);
– recurring charges (level/ proportion) and timing;
– discount rate/cost of capital;
– assumed scale of entrant (efficiency);
– number of price points/size of risk transfer;
– depreciation profile and truncation.

The nature of the risk-sharing price scheme would also need to be distinct from a volume discount that could be deemed anti-competitive. As also noted in the European Commission's Recommendation on NGA networks, price discounts based on volume commitments are acceptable to the extent that the discount reflects only the reduction in average costs per line that results from a risk transfer from the incumbent to the entrant.[56] A DCF approach should highlight the exact financial risk transfer in the risk-sharing pricing scheme.

The alignment to the margin squeeze test itself could present implementation problems, given the complexities associated with various pricing structures with high upfront fees that reflect OAOs' expectations of future take-up. A pragmatic approach could be to require that at least one price plan is a 'one-part' tariff (similar to the current per-line bitstream), and the (ex ante) margin squeeze test would be conducted for that simple price plan.

4.2 Assessment of bundles with an NGA component

ComReg is in the process of consulting on the appropriate pricing framework for bundled offers. Oxera has assisted the regulator in that process and hence the assessment here builds on existing analysis. The critical question is: does the emergence of NGA warrant changes to the existing framework? The following conclusions seem reasonable in this respect.

– The net revenue test could be conducted for portfolios of bundles, rather than product by product. As noted by Oxera, there are sound economic reasons to allow efficient price discrimination and hence cost recovery from a broader range of services. This is further reinforced in the NGA environment, where greater bandwidth enables further product differentiation.

– The net revenue test would be undertaken on the basis of consistent assumptions with legacy bundles regarding OAOs' efficiency. This is because largely the same economies

[56] Towerhouse Consulting (2011), 'Wholesale pricing for next generation access networks', report for Vodafone.

of scale are present for NGA broadband and legacy broadband (see earlier discussion in section 3 on certain dedicated incremental costs).

– The treatment of additional unregulated products is likely to be even more relevant in the context of NGA-based bundles than it is currently, given that NGA will enable the provision of IPTV services, for example. Applying the same principles would seem appropriate (ie, the LR(A)IC(+) of unregulated products should not exceed the incremental revenue derived from these products).

Two aspects seem to warrant further examination in the context of NGA: could the test be based on VUA rather than a combination of NGA Bitstream and WLR; and, if so, is it appropriate to expect entrants to provide voice services over IP?

While a detailed feasibility assessment is beyond the scope of this report, it is noted that VUA and legacy ADSL products that support CoS traffic prioritisation could allow an entrant to deploy a softswitch (at the exchange, connected to their backhaul network) and run voice over broadband/VoIP. If the entrant has a broadband wholesale input (VUA), in principle it might not need another eircom input (copper, PSTN termination) to offer voice services. To date, there is no evidence of significant VoIP offerings in the Irish market (such that they meet quality standards equivalent to those required from 'plain old telephone services' (POTS)). eircom's plans to implement such a solution are not yet fully concrete. Furthermore, it is noted that ComReg has not considered VoIP as a substitute for PSTN voice in the retail market definition.

Consequently, it would not seem reasonable to conclude that VoIP is a viable form of regulated entry under the current circumstances, and hence the net revenue test would use the WLR price as a base (although this may need to be adjusted). There are various practical considerations on how PSTN-based services will continue alongside VUA. However, from an economic perspective, different combinations of adjustments to the wholesale prices could be reasonable, as long as the following two conditions are complied with:

– there should be no over-recovery of the shared cost elements. In other words, the common network costs between the aggregation node (exchange) and end-user premises should be recovered through the price of either VUA/bitstream or WLR, but not through both;

– margin squeeze should be avoided on the basis of the principles set out above (and as presented in the bundles consultation[57]).

When a viable voice product can be provided as an add-on alongside NGA-based bitstream or VUA, the same economic principles apply: over-recovery of common costs should be avoided and the margin squeeze test should be complied with. In effect, if (and only if) a substitute for legacy-level voice service can be provided, it does not matter what the underlying wholesale inputs are provided that OAOs can replicate the bundle on the basis of the established principles.

Furthermore, should the net revenue test be based on VUA and a VoIP-based voice service were accepted, the following further consideration seems necessary: as discussed above, alternative wholesale inputs (VUA in NGA areas and LLU in other areas) are most appropriate in territories where sufficient scale can be achieved. If the test is applied uniformly throughout Ireland, there is a risk that entrants will be excluded in sparsely populated territories where VUA is not a viable form of entry.

[57] ComReg (2011), 'Consultation and Draft Directions: Review of the appropriate price controls in the markets of Retail Fixed Narrowband Access, Wholesale Physical Network Infrastructure Access and Wholesale Broadband Access', October 10th.

To ensure sufficient entry conditions for entrants that do not have resources to invest in their own backhaul and interconnect at the exchange level, ComReg may consider the application of a blend of VUA and wholesale products as the applicable wholesale input cost.[58]

[58] It is up to eircom to arrive at wholesale solutions unless SMP exists. If eircom has SMP then it must provide equivalent access products.

5 Application of pricing remedies: relationship between legacy and NGA pricing

As set out in the introduction to this report, eircom plans to retain the copper side connections and some legacy telephony equipment within the NGA deployment area. Oxera is not aware of any concrete proposals by eircom to remove legacy telephony or broadband equipment in the NGA-areas (ie, outside the UPC footprint, other than Letterkenny). As the details of any copper switch-off are uncertain, this report assumes that eircom will offer both legacy and NGA wholesale products in the short to medium term, or 'transition' period.

5.1 Pricing of legacy access and NGAs

The economic characteristics of relevant network elements and access products set the basis for the design of appropriate price controls. Before assessing the specific types and assumptions of price controls, it is helpful to explain the relationship between the pricing framework for legacy and NGA, which dictates the choice of appropriate pricing remedies. Indeed, while (as far as Oxera is aware) ComReg will be reviewing the copper access model for LLU and SLU separately in 2012, the implications that eircom's NGA roll-out may have for copper access pricing are assessed when determining pricing methodologies for eircom's NGA products.

These considerations are closely related to the European Commission's recent statements and the associated consultation, which seems to reflect the situation in Ireland:

> In this regard, regulatory consistency in costing methods is particularly important in the context of recent market developments. The deployment of a new fibre based next generation access (NGA) network requires considerable investments and involves a significant risk which should be duly remunerated. At the same time, copper-based telecoms services (offered by SMP operators and service providers on the SMP operators' networks) are facing in parts of the EU increasing competitive constraints from cable TV networks, in terms of speed and prices. Alternative operators find it increasingly difficult to compete on the basis of today's access prices. In any case, consumers' switching to cable, mobile and NGA retail products has led to a reduction of services provided over the copper networks, which increases the unit costs of copper and consequently access prices where the so called BU-LRIC models are used.[59]

Broadly, three issues need to be considered in the context of the interplay between NGA and legacy networks.

– **Substitutability**: fibre- and copper-based broadband are close substitutes (as identified by ComReg), thus the price charged for one of them affects the demand for the other. The higher the LLU price (relative to NGA), the greater the incentives are for the OAOs and end-consumers to migrate to fibre. Thus, there may be a policy interest to promote the migration from copper to fibre-based retail offerings.

– **Investment incentives**: the relative price of NGA and copper affects the incumbent's (expected) profitability from the different ways of delivering services and, as a consequence, its investment decision in NGA. The higher the LLU price, the lower the profit increment that the incumbent can obtain from investing in NGA. Thus, the

[59] See European Commission (2011), 'Questionnaire for the Public Consultation on Costing Methodologies for Key Wholesale Access Prices in Electronic Communications', October 3rd, http://ec.europa.eu/information_society/policy/ecomm/doc/library/public_consult/cost_accounting/costing_methods_questionnaire.pdf.

incentive for the incumbent to invest in NGA is also lower because it loses a large margin on the legacy network (assuming that LLU prices do not affect demand for NGA services). This aspect may be of limited relevance in the Irish context, given that eircom has already committed to invest to a certain extent (see section 1).

– **Dual-running**: the incumbent may have incentives (or may be forced by regulation) to maintain the legacy access network even where the NGA network is rolled out, given that consumers may wish to retain their PSTN voice services and some OAOs may require sufficient notice periods to sweat their existing investments in DSL electronics. It is Oxera's understanding that eircom will retail its legacy network at least in the medium term. On the other hand, maintaining both networks, especially below scale, could overall be inefficient and costly. (This could justify 'forced migration' in order to reduce costs, although this regulatory option represents a somewhat tough regulatory stance and its evaluation is beyond the scope of this report.)

5.1.1 Features or LRIC model for copper access pricing when NGA is rolled out

In the context of NGA roll-out, the decrease in demand for copper can be anticipated (or is already happening, partly due to increased competition from alternative platforms). This could have an additional effect on the relative price. In particular, LLU is regulated on a BU-LRAIC plus basis in Ireland (and some other Member States). The use of BU-LRAIC plus (using CCA) has the following properties.

– The LRIC model builds on a forward-looking perspective with respect to investments and values the sunk investment on the basis of the costs that would be incurred to rebuild that asset. It is not reasonable to assume that operators would invest in copper networks going forward, which in turn implies that the modern equivalent asset value of copper networks corresponds to the current costs of fibre network elements. This approach may be problematic, however, given the better 'quality' of fibre networks compared with copper (which could be addressed by reducing the cost of copper to reflect its lower quality).

– Insofar as fibre supersedes copper, the take-up of LLU diminishes, which in turn increases its unit cost and hence price. This may be problematic conceptually: if eircom (or indeed any of the OAOs relying on copper access) loses a customer because of the superior quality of fibre (eg, provided by UPC), the value of copper assets erodes, rather than increases. In light of this reasoning, it would not seem appropriate to increase the price of LLU.

– Under LRIC the network is valued at replacement cost and overcapacities are usually not reflected in the cost model. In the case of decreasing demand for copper, overcapacities develop and no replacement investment takes place—hence, the current prices of such assets may not be meaningful in this context.[60]

– It has also been argued that static efficiency is jeopardised if (BU-)LRIC is continued to be used. Conceptually, this could lead to price increases because the quantity base over which the fixed costs are spread is smaller. However, in competitive market conditions when a firm faces declining demand, it would want to lower its price if this would stem the loss of customers and was profit-maximising (or loss-minimising). As a matter of economics, the notion of increasing unit cost as demand falls may be irrelevant, insofar as the costs of the copper access network are already sunk. Hence, it may not be appropriate to include these costs in a forward-looking approach based on efficiency considerations if there is no prospect of these particular assets ever being replaced.

During the transition, the existing network and NGA will compete with one another for (wholesale) customers.[61] In this context consumers' choice depends on the relative cost of

[60] WIK-Consult (2011), 'Wholesale pricing, NGA take-up and competition', April 7th.
[61] Plum (2011), 'Costing methodology and the transition to next generation access', a report for ETNO, March.

these services and their incremental willingness to pay for very fast broadband. Furthermore, during the transition, civil infrastructure may be shared between copper and fibre, which means an additional challenge in determining the relevant costs for each.[62]

5.1.2 Regulatory objectives

Overall, the regulatory decision on costing principles builds on policy objectives, and needs to strike the right balance between:

- incentivising investments in fibre networks;
- incentivising cost minimisation and remuneration for fibre investments—ie, migration from copper to fibre to minimise possible inefficiencies of dual-running; and
- ensuring that OAOs have access to wholesale inputs with maximum potential for product differentiation and to minimise the activities that fall to be provided on a monopoly basis.

If the incumbent has already invested an NGA network, or committed to do so, the first concern about investment incentives is of limited relevance, insofar as the commitment to invest is credible and not conditional on the design of the regulatory framework. In such circumstances, which seem to be present in Ireland, the second and third regulatory objectives seem more relevant. In other words, ComReg may wish to ensure that entrants have sufficient incentives to migrate from legacy access services to fibre-based access, which would ensure both cost minimisation (ie, the maintenance costs of copper infrastructure), and remuneration of fibre investments. However, sufficient time and adequate conditions for an orderly transition would need to be considered in order to ensure consistency with ComReg's past determinations.[63]

A strict application of asset valuation principles on the basis of the considerations discussed above would be likely to lead to considerably lower costs for those parts of the copper access network that would not be replaced or reused for the NGA network, in those areas where NGA is to be rolled out. (For example, these copper assets could be valued on the basis of HCA.) A potential concern is that the resulting lower LLU price in these areas will imply greater incentives for OAOs and consumers to remain with copper-based products. Such an outcome would be economically efficient if the benefits reaped from additional scope for product differentiation and innovation available over LLU are greater than those that the OAOs could achieve by migrating the NGA equivalent—ie, VUA. The regulatory trade-off has been summarised as follows:

> The implications of these considerations is that long-term efficient investment is more likely to be supported by copper LLU prices being regulated at a level that is at approximately the same level as the NGA price, and without any precipitous reduction based on regulatory intervention. This may involve the sacrifice of some short term static efficiency gains that might be achieved through low LLU prices that cover only forward looking incremental costs. But it will likely lead to greater dynamic efficiency by encouraging fibre roll-out by eircom, wholesale access take-up by competitors and switching to fibre-based retail products by consumers.[64]

It is argued that the problem of substitutability solved by forced migration—possibly with 'anchor products' which resemble the quality and price of products supplied on the legacy network but are supplied over the NGA network—could take care of the migration effect. This might also reduce costs since it would not require the parallel maintenance of the two networks. However, this does not address the possible sunk investments of the OAOs that can be used only with the old copper assets. Indeed, an appropriate remuneration for existing LLU investments over the transition period would seem important, given that there is some uncertainty about the functionality and the return profile achievable through VUA.

[62] Ibid.
[63] While the investments in DSL electronics are relatively limited and asset lives are short, a coordinated transition would seem to be required.
[64] Walker (2011), op. cit.

5.2 Pricing of eircom's legacy products during and after NGA roll-out

5.2.1 Applying wholesale price regulation in the presence of retail pricing constraints

The design of pricing principles needs to be proportionate to the competition problems identified. In particular, the following market dynamics are central to Oxera's assessment of the relative merits of different options.

– In areas where UPC has a footprint, eircom is losing market share. These customers use UPC for both broadband and telephony (and TV)—hence, they often do not use of PSTN. This represents 800,000 homes and approximately 60% of the market.[65] eircom's ability to compete with UPC is constrained with respect to those customers, who are 'quality-sensitive'—ie, likely to switch to a faster service if this is provided at the same price. As a result, as noted above, eircom's unit costs in these areas are rising. Put another way, the number of subscribers and hence revenue are declining, but costs are not declining proportionally.

– On a forward-looking basis, the economic value of sunk copper assets in UPC areas is low, potentially approaching zero to the extent that customers do indeed switch to UPC. As explained above, precisely because these assets are sunk, their economic value is the residual of revenue (which is constrained by UPC) minus operational costs and other non-sunk costs.

– On a marginal basis, eircom can roll out FTTC and sell the services at prices that match UPC and (again on a marginal basis) recover the cost of that marginal investment. However, this suggests that that the implied value of the existing copper assets from the home to the street cabinet, which would still be used, would be low/zero. Other sunk 'copper' assets that may also be used in the NGA network (eg, ducts between the cabinet and the exchange) may also have a very low residual value.

– If a cost-plus approach were employed for NGA Bitstream or VUA, and the current prices for passive inputs were used as components of the price, the resulting price would be likely to be higher than UPC's offer for corresponding services at the retail level.

eircom is allowed to reduce its copper access prices—ie, the prices of LLU and SLU are price ceilings rather than fixed prices of these inputs. The price ceiling derived with the LLU model is calculated according to those exchanges that ComReg has considered are 'unbundlable'—this is broadly the same area where eircom is deploying NGA. Thus, eircom can, and should have the incentive to, adjust its retail and wholesale prices to meet cable competition if the retail price levels require such adjustments.[66]

Where it is not reasonable to assume that an efficient entrant would invest in new copper (sub-) loops, it seems that an alternative asset valuation approach could be employed. The level of the 'cost-recovering prices' depends on the asset valuation principles employed. Using an HCA-based approach for copper access and ducts, for example, is likely to result in considerably lower SLU/LLU prices, which would still be 'cost-recovering'—ie, eircom would still earn appropriate revenues to recoup the cost it has actually incurred.

Even prices below HCA may be justified provided that the price is above the marginal cost of the provision of the service (ie, it is loss-minimising where the alternative is no provision of the service at all, because customers have migrated to UPC's network).

The recognition of these relationships feeds into the design of appropriate regulatory options, presented in section 6.

[65] Information obtained from ComReg.
[66] Although, at present, it cannot increase the LLU price outside cable areas above the price ceiling.

6 Oxera recommendations for eircom's NGA for the next three to five years

6.1 Form of price regulation: approach and assumptions

Drawing on the above assessment, this section presents potential options for the appropriate form of price regulation for eircom's NGA now and going forward. The recommendations build on a review of what adjustments are required to the existing price regulation to allow eircom sufficient pricing flexibility to remain competitive where it faces competition from UPC, while still providing OAOs with opportunities to enter the retail market through the purchase of eircom's wholesale products.

On the basis of the above reasoning, Oxera concludes that there is currently insufficient evidence that it is actually in eircom's interest to provide access on reasonable terms without any price regulation. However, rather than a stringent cost-based pricing obligation, a margin squeeze-based control would seem more appropriate for the next price control period, primarily because:

– where NGA is deployed, eircom is facing retail pricing constraints from UPC's cable offerings, which removes the concern that *retail* prices would be too high.[67] The wholesale prices would be cross-checked with a cost-plus approach to ensure that they are not below (or substantially above) the relevant costs. The relevant cost test for 'too high' is likely to be different from the 'too low' test;

– monitoring of margin squeeze allows retail (and wholesale) price discrimination, which may be necessary for new services;

– there is some demand uncertainty surrounding NGA investments, although this is limited by the defensive nature of these investments, and the costs of NGA deployment are also unknown to some extent.

Following the reasoning presented above in relation to the economic space, it would seem sensible to apply the margin squeeze test throughout the supply chain—ie, between retail and between various wholesale inputs.

As noted above, asset valuation approaches are of limited relevance where prices are constrained by competition. Consequently, there seems to be limited economic underpinning to consider that the current LLU and SLU prices constitute cost-based price floors below which eircom cannot reduce its other tariffs (taking into account other relevant costs between retail and wholesale, and between various wholesale, prices).

Furthermore, the test should apply in all geographic areas where NGA networks are deployed.

The specific assumptions recommended by Oxera are summarised in Table 6.1.

[67] As noted above, NGA pricing is also constrained by the pricing of LLU-based OAOs, given that the retail services are substitutable.

Table 6.1 Summary of pricing assumptions (margin squeeze test, active NGA services)

	Recommended approach	Underlying assumptions
Assumption on efficiency	Similarly efficient operator, but equally efficient operator as soon as entrants have gained scale, or potentially a glidepath	Consistency across different layers of the supply chain Approach consistent with legacy WBA (25% market share assumption)
Level of aggregation	Portfolio	Efficient price discrimination allowed for ranges of broadband speeds
Costs	Forward-looking long-run average incremental cost (LRAIC+); average total costs for the portfolio	Consistency across different layers of the supply chain Entrants expected to enjoy some economies of scope as they are active in a number of adjacent retail markets. To the extent that eircom benefits from significant economies of scope that are not available to OAOs, an appropriate mark-up for common costs could be included or ATC considered
Period-by-period or forward-looking	Forward-looking	Test based on monthly prices and costs (fixed upfront costs converted into monthly costs over average customer lifetime) Assessment of cash flows over time in a DCF framework may be necessary because of the uncertainties associated with NGA upfront costs (eg, new equipment and installation); and risk-sharing pricing structures involving high upfront fees relative to recurring monthly charges
Voice service (bundles)	WLR	No evidence of significant offerings of VoIP that meets the quality standards of, and could be considered as a substitute for, legacy-level voice services

Source: Oxera.

To ensure that prices are indeed cost-reflective (and not below relevant costs), ComReg could use the cost-plus approach as a cross-check. (As discussed above, this approach has been employed by Ofcom, for example.)

6.2 Options to meet policy objectives

Notwithstanding the above conceptual reasoning, the appropriate pricing framework needs to be tailored to achieve ComReg's objectives, which, in Oxera's understanding, are:

(i) orderly migration to fibre-based services;[68]

(ii) cost minimisation (avoiding lengthy dual-running); and

(iii) competition at the deepest level of the network to the extent economically feasible and maximum scope for product differentiation.

The regulatory approach adopted by ComReg therefore needs to recognise the inherent trade-offs between these objectives. It would seem to be in the interest of all stakeholders to migrate to a single high-speed platform as soon as possible if (and only if) it can be guaranteed that (a) the migration process would not unnecessarily distort OAOs' operations; and (b) the wholesale products available post-NGA roll-out are those that deliver the most

[68] NGA networks are envisaged to produce wider benefits for the society.

economically efficient outcomes in terms of accessibility, technical capability and scope for differentiation.

Given that the migration process is led by eircom, rather than in any coordinated fashion (which would be the case under a co-investment model), there seems to be a degree of uncertainty about the specific timing of the migration process, and the technical feasibility and economics of NGA products—in particular, VUA.[69] As a consequence, it would seem reasonable to take into account the transition period over which the OAOs migrate to the new network (possibly over the next 3–5 years).

The prices of NGA products *relative to* copper-based access play an important role in providing the industry (both eircom and the OAOs) with incentives to stay on the copper platform (and continue using products such as LLU and bitstream) or to migrate to NGA. Furthermore, the design of options relies on the assumption that eircom is committed to deploy fibre networks in any event, and hence the rationale to *promote* NGA investments by lowering copper prices (as proposed by the Commission, WIK-Consult, Vodafone) is less relevant in the Irish context.

Reflecting on these considerations, two regulatory options are presented below, together with their respective implications.

Option 1: No changes to current LLU prices irrespective of the pricing of NGAs

This option does not build on the reasoning set out above on the apparent links between legacy and NGA pricing. Rather, insofar as the legacy products would become more expensive relative to NGA (in quality-adjusted terms), it would be based on the potential policy objective to promote swift migration to NGA, as follows.

– **In the short term** OAOs may not find it economically feasible to invest in further LLU. Rather, they would be expected to start migration to VUA (and other NGA products) as soon as these become available. The migration might not happen immediately, depending on the magnitude and remaining economic lifetime of their current investments in DSL electronics.

– **In the medium and long term** all operators could be migrated to a single platform. The costs of dual-running would be avoided, but there are considerable uncertainties regarding the swift migration process and the functionalities of NGA products. The entrants might incur losses (resulting from the squeeze between legacy and NGA pricing), which could have implications for the industry structure and competition in the medium term.

Option 2: Apply the margin squeeze test consistently across different access products

As explained above, there are no sound reasons to assume that, during transition, legacy access pricing should be considered in isolation from the prices that apply to NGA products. In effect, such an assumption would assume that the two types of product belong to completely separate economic markets—ie, end-users (demand side) and service providers (supply side) would not view broadband connections of different speeds as having any significant substitutability. This would be inconsistent with ComReg's market definition (or indeed any broadband market definition of which Oxera is aware).

Recognising these links, the implication for the margin squeeze test is that adjustments to the current LLU/SLU prices may be required in order to secure economic space both *within* the NGA supply (retail—bitstream—VUA—SLU) chain and *between* legacy-level access and NGA-based wholesale products. Thus, the resulting LLU price is likely to be set by reference

[69] OAO responses to Oxera's questionnaire.

to the price of VUA in quality-adjusted terms. In other words, the price of LLU would not be the same or higher than the price of VUA.

The following implications would be likely.

– **In the short term** OAOs' current and planned investments would not be 'squeezed': the OAOs could price retail services to meet competition with eircom on a profitable basis. For example, a legacy OAO would provide a lower-quality 'legacy-level' broadband service compared with eircom's (and UPC's) NGA offerings, but would be able to price at a level that enables competition at lower price points/customer segments. This would be expected to provide consumer benefits in the short term, and would result in less distortion to the OAOs' current investments in DSL electronics. There is some uncertainty about the technical features and economics of eircom's VUA products, hence the OAOs might be risk-averse and rely on the 'tried-and-tested' LLU products in the short term. In addition, they would be free to use VUA as an input if they wished to compete in the provision of services that can be supplied only via the NGA infrastructure.

– **In the medium and long term** the OAOs might have stronger incentives to stay on the copper platform for longer than would be cost-efficient for eircom. If the market-level demand for high-speed broadband is low, the OAOs might not only rely on LLU over the lifetime of their existing DSL assets, but there could be further investments in LLU. This would result in higher total industry costs and hence end-user prices in the longer term. The long-term implications depend crucially on whether the VUA product is indeed designed in a way that ensures maximum product differentiation and can provide a more cost-efficient input for those services that are most equivalent to legacy services.

Given that it would not seem efficient to promote further LLU over too long a time period, the following features could be introduced.

– **Feature 1**: OAOs using LLU would pay the incremental cost of running two separate networks beyond a pre-specified time. This would incentivise orderly migration.

– **Feature 2**: eircom would be subject to a monitoring scheme (including financial penalties) to ensure that it meets the service-level agreements specified for the NGA products. This would mitigate the risks around pricing and technical features of new access products (VUA, in particular), which can otherwise hinder migration.

7 Counterfactual: co-investment

The regulatory framework for NGAs described above assumes that the industry structure would be one in which a vertically integrated operator—in this case, eircom—provides access to OAOs on regulated terms. In the current context, this structure seems likely to continue in Ireland for some time, given that eircom is committed to invest in FTTx (as described in section 1), and, as far as Oxera is aware, there have been no significant proposals for alternative industry models.

In this respect, an alternative to the vertically integrated structure could be a model whereby the cost of NGA investment is shared between several parties; namely, the following two approaches could be envisaged:

– a co-investment model where several operators, and potentially external investors such as financial institutions, invest jointly in a vertically separated network operator, which would provide access to FTTx to its owners and other entrants;

– a co-investment model where the investment project is partially publicly funded.

These two types of co-investment are described below in terms of their implications for price regulation.

7.1 Commercial co-investment

A model where the downstream operators invest jointly in a network company that would then provide access to all its participants and independent OAOs exhibits some similarities to functional and structural separation. It has been argued that, under vertical separation, the increased transparency allows regulators to grant further discretion to the regulated firm to set prices. Separation has been considered as likely to be effective in reducing the asymmetry of information between incumbent operators and regulators.[70] Structural separation in itself may not, however, be a sufficient condition for the regulators to relax some or all of the current rules, or to pre-commit to a longer period between regulatory reviews.

Notwithstanding the caution that regulators have shown about deregulating structurally (or functionally) separated network companies, there are reasons to suggest that the co-investment model could be introduced in a way that mitigates at least some regulatory concerns.

ComReg could have reasons to employ a less stringent set of remedies, if (and only if) the co-investment model were introduced in line with principles that ensure effective competition between downstream service providers, and incentives for competitive investment in active equipment going forward. This is an important finding of Oxera's recent study, and is consistent with the European Commission's recommendation on NGA regulation:

> Networks based on multiple fibre lines ensure that access seekers can obtain full control over fibre lines, without having to duplicate costly investments or risking discriminatory treatment in case of mandated single fibre unbundling. Networks based on multiple fibre lines are therefore likely to lead to more timely and more intense competition on the downstream market. Co-investment into NGA networks can reduce

[70] ERG (2009), 'Report on Next Generation Access - Economic Analysis and Regulatory', ERG (09) 17, June, p. 22. Available at Principleshttp://erg.eu.int/doc/publications/erg_09_17_nga_economic_analysis_regulatory_principles_report_090603_v1.pdf.

> both the costs and the risk incurred by an investing undertaking, and can thus lead to more extensive deployment of FTTH.[71]
>
> Arrangements for co-investment in FTTH based on multiple fibre lines may in certain conditions lead to a situation of effective competition in the geographic areas covered by the co-investment. These conditions relate in particular to the number of operators involved, the structure of the jointly controlled network and other arrangements between the co-investors which aim at ensuring effective competition on the downstream market. In such a situation, if competitive conditions in the areas concerned are substantially and objectively different from those prevailing elsewhere, this could justify the definition of a separate market where, after the market analysis according to Article 16 of Directive 2002/21/EC, no SMP is found.[72]

Where no SMP is found, no ex ante remedies would be introduced. ComReg should be cautious, however, and the conditions under which ex ante regulation could be relaxed, or scaled back in full, should be clearly articulated ex ante. It would seem necessary that the following pre-conditions be defined.[73]

– Under the status quo, eircom and OAOs have different incentives and separate systems of governance. In a commercial co-investment model, the governance structure could consist of several insiders (owners) with incentives to preserve downstream competition (and consumer welfare). An industry code of conduct would seem necessary to achieve legitimacy, and would serve as a mechanism to ensure that the co-investment arrangement could not favour any particular service provider, such as eircom (which could be the largest wholesale customer). A board structure for the co-investment entity that addresses some of the asymmetries between incumbent and entrants, together with a well-designed code of conduct, could lower the incentive to discriminate between participants compared with a vertically integrated incumbent.

– It should be possible for new entrants to use the NGA access network either by purchasing a stake in the co-investment entity or by negotiating commercial access terms in the wholesale market, whether through an active access service or a re-selling arrangement.

– As ComReg would be involved in designing and supervising the industry code of conduct, there would be an ex post monitoring scheme to ensure the co-investment entity's compliance with the objectives on non-discrimination.

Under this structure, ComReg would nevertheless need to oversee the functioning of self-regulation. Where disputes arise, it could be the first independent arbitrator. Circumstances under which the regulator would intervene would need to be specified ex ante in the industry code of conduct, according to the following characteristics:

– if there are complaints backed by evidence on discriminatory behaviour in wholesale processes—ie, if the entity's performance on key performance indicators is not consistent with the predetermined targets set out in the service-level agreements;

– if the returns (internal rate of return) substantially and persistently exceed the cost of capital beyond a predefined excessive level.

In all, the design of the co-investment scheme should build on the objectives to achieve regulatory time consistency and to be robust across different phases of network roll-out, given the evolving demand and supply conditions.

[71] European Commission (2010), 'Commission Recommendation of 20 September 2010 on regulated access to Next Generation Access Networks (NGA)', September 20th, para 27.
[72] Ibid., para 28.
[73] These pre-conditions are discussed in detail in Oxera's recent report on co-investment. Oxera (2011), 'How a co-investment model could boost investments in NGA networks: Feasibility and implementation of a co-investment model', November, available at www.oxera.com.

7.2 Partially publicly funded NGA networks

This sub-section provides a high-level commentary on some relevant considerations relating to partially or entirely publicly funded network. It is not, however, within the scope of this report to assess the specific implications for Ireland.

As with any government financial intervention, a publicly funded NGA roll-out may raise concerns about a potentially distortive impact of state aid. More specifically, at least two potential concerns may require careful consideration from the European regulators.

– **Crowding out competitive investment**. Long-term incentives for private investments by both the incumbent and OAOs may be distorted if there is an expectation that state funding will be provided for broadband networks. Such 'crowding out' may offset the positive spillover effects associated with such expanded networks. For example, long-term evolution mobile networks may prove to be a more efficient way of delivering super-fast broadband in rural Ireland (non-CVAs) than 'traditional' fibre-based solutions.[74]

– **Market structure**. The designation of subsidised universal service obligation (USO) NGA operators might result in sub-optimal market outcomes if there is no effective competition for the rights being allocated. For example, this might occur if local economies of scale and/or scope (perhaps arising from existing backhaul or access networks) imply that only a limited number of operators are able to acquire the rights to operate the extended networks.

To address these potential concerns, the European Commission has issued guidelines on state aid issues in relation to NGAs. Three areas are defined in the guidelines, depending on the extent of competition:[75]

– **white areas**—no commercially viable NGA networks exist, and state funding would not distort competition;

– **black areas**—at least two providers are engaged in facilities-based competition, no market failure exists and therefore no further public funding is warranted;

– **grey areas**—only one NGA network is present and further assessment is required. More specifically, with the aid of the respective NRA, the Commission would seek to obtain information on the prospects for private network deployment within the next three years.

Faced with the above risks of market distortion, the following factors are relevant when considering the scope of intervention:

– the choice of funding mechanism for network construction has a direct impact on the market structure that follows from the designation of the USO provider or rural NGA operator; and

– the regulatory regime designed for private investment may need to be revisited in the context of state-funded networks.

While the European Commission's guidelines do not specify how any potential capital injection would be financed (eg, whether through tax rebates or subsidies), the guidelines are clearer about the granting mechanism:

[74] Some public funding initiatives for long-term evolution networks have also been announced. See European Commission (2009), 'EU Invests a Fresh €18 million in Future Ultra High-speed Mobile Internet', press release, IP/09/1238, August 18th.
[75] European Commission (2009), 'Community Guidelines for the Application of State and Rules in Relation to Rapid Deployment of Broadband Networks', September.

> The open tender approach ensures that there is transparency for all investors wishing to bid for the realisation of the subsidised project.[76]

Competitive tenders are usually designed as 'reverse auctions', such that the operator asking for the lowest subsidy is designated as the provider of rural broadband or NGA connections. An important consideration in the design of tenders is whether a genuinely competitive process can be guaranteed.

[76] European Commission (2009), 'Community Guidelines for the Application of State Aid Rules in Relation to Rapid Deployment of Broadband Networks', September, para 59 (b).

8 Conclusions

This report has presented principles for the need for, and application of, price regulation in the context of NGA networks and wholesale products. A number of specific propositions are put forward for the current context (the next three to five years). These are notably the following.

– eircom is unlikely to have sufficient incentives to provide appropriate wholesale access on a voluntary basis. Even if access were provided, there are credible concerns that commercially determined access pricing would not be consistent with ComReg's objectives, or even competition law. In order to provide OAOs with sufficient certainty over the entry conditions, an ex ante price regulation does seem warranted.

– The planned NGA footprint in the medium term is mostly (but not entirely) equal to the UPC cable footprint. In these areas, eircom faces a retail pricing constraint from UPC, which is already providing high-speed services. Indeed, eircom's investments in NGA can be considered defensive. As a consequence, there are few concerns that the retail prices would be excessive. Under such circumstances, cost-plus regulation is unlikely to be meaningful, given the conceptual and practical difficulties associated with asset valuation of networks that are, to some extent, subject to a competitive constraint. As appropriate access prices are necessary (despite the *retail* pricing constraint), it would be essential to ensure a sufficient margin between retail and wholesale, and between the various wholesale inputs.

– The margin squeeze test is designed to ensure consistency across the supply chain, and between legacy and NGA products and inputs. Legacy products are substitutable with NGA products at the retail level, and both are supplied largely on common network inputs—in particular, the copper connection between a street cabinet and an end-user. As a result, the current BU-LRAIC plus-based access charges for LLU and SLU may need to be adjusted downwards, should the margin squeeze test render such a revision necessary.

– Provided that the pricing and accessibility of NGA products are appropriate and allow enough innovation at the retail level, it would be efficient to migrate all operators in an orderly fashion to a single, next-generation, platform. This would avoid any additional costs of dual-running (even if small), and is consistent with the objective to enhance the take-up of advanced services. However, it would be in line with ComReg's previous policy decisions and regulatory determinations to allow a sufficient transition period (possibly of three to five years) over which the OAOs have sufficient payback time for their existing investments, and over which the NGA products become tried and tested in terms of both technical features as well as pricing structures.

A1 Impact assessment

The review of NGA pricing principles must consider whether any price regulation is warranted, and, where a remedy is required, ensure that it is proportionate to the level of competition in the relevant markets (Markets 1, 4 and 5).

A1.1 Policy objectives against which options are assessed

In designing the remedy, the main objective is to promote efficient investment in access network infrastructure, while retaining the most appropriate solutions for situations where eircom has SMP. More importantly, any solutions proposed must be consistent with planned and future NGA deployments, and with ComReg's overarching policy objectives: the promotion of the interests of users within the community; the promotion of competition; and contribution to the development of the internal market. More specifically, ComReg's objectives, and the ways in which the design of access regulation in Markets 4 and 5 (with respect to the NGA products) seeks to address them, are summarised below.

A1.1.1 Promoting the interests of users within the community

Safeguarding efficient competitors from possible below-cost selling by an SMP operator in respect of high-speed broadband products helps to facilitate greater regulatory certainty for longer-term competitive entry and expansion, with positive implications for the price, choice and quality of services delivered to end-users.

A1.1.2 Ensuring that there is no distortion or restriction of competition

By seeking to pre-empt the possibility for anti-competitive pricing practices by an SMP operator to induce strategic barriers to entry in markets, wholesale pricing should ensure that competitors can enter and sustain competition in the markets for retail broadband and in adjacent markets.

A1.1.3 Encouraging efficient investment in infrastructure and promoting competition

In taking account of the current state of competition in certain areas, NGA pricing remedies should encourage entry initially and expansion by competitors wishing to invest in their own infrastructure over time, at the deepest level of the network where economically feasible, and to allow them to differentiate their products to the extent possible where active access is used (NGA Bitstream, VUA). At the same time, regulated pricing should facilitate entry by competitors as efficient as the SMP operator, which is consistent with encouraging efficient investment.

A further objective is to ensure that operators have the right incentives to use new NGA services as opposed to legacy wholesale services, and that the pricing of the two platforms, which are to some extent parallel, is consistent and does not lead to a margin squeeze within a platform or between two platforms.

A1.2 Impact on stakeholders and competition: qualitative assessment

For the purpose of an impact assessment, the relevant options need to be defined. Oxera's approach to option selection is to map out the decisions in Figure 1.2 as increments from the proposed remedy. At each stage of the decision tree, counterfactual options are built alongside the factual equivalents of increasing detail. Table A1.1 below illustrates.

Table A1.1 Scenarios discussed in the impact assessment

	Stage 1—is price regulation needed?	Stage 2—form of price regulation	Stage 3—assumptions of price regulation
Base	Price regulation warranted (margin squeeze test)	Margin squeeze test	Margin squeeze test, SEO, DCF, portfolio, forward-looking LRAIC(+)
Counterfactual 1	Commercial agreements/ regulatory forbearance and ex post monitoring (margin squeeze)		
Counterfactual 2		Cost-plus pricing	
Counterfactual 3			Base, but with alternate assumptions

Source: Oxera.

A1.2.1 Stage 1: Is price regulation needed?

The implications of counterfactual scenarios are assessed against the base case: 'Price regulation warranted', whereby eircom would be subject to ex ante price regulation (in the form of a margin squeeze test).

Under the model recommended in this report, eircom's wholesale pricing is not defined ex ante; rather, as described in the report, where eircom faces a retail pricing constraint coupled with demand and cost uncertainty, a regulatory pricing structure that allows pricing flexibility seems reasonable. In effect, the approach is not inconsistent with an ex post competition law-based intervention, although certain assumptions (efficiency, cost standard) are designed to ensure that small OAOs have sufficient prospects of entry.

As discussed above, the main implications of the recommended 'base' scenario are as follows.

– Future NGA investments have a degree of regulatory certainty; recovery of investment is not constrained by the price control.

– The incumbent is restricted in foreclosing on OAOs via margin squeeze and the OAOs face an ex ante-defined economic space between legacy and NGA products, which is expected to provide sufficient margin for entry. The margin squeeze test is designed to encourage efficient entry.

– Consumers benefit from increased competition in downstream markets (price, quality and choice).

Counterfactual 1: Ex post monitoring (margin squeeze)

The following implications seem likely:

– **eircom** would have the freedom to negotiate wholesale NGA pricing with OAOs. While still subject to competition law, prices would not be subject to any regulatory pressure or uncertainty. As such, this 'no intervention' scenario would not distort eircom's investment incentives in any way. Insofar as eircom would exploit the flexibility by charging OAOs high or otherwise discriminatory prices, this could result in enhanced returns to eircom in the medium or long term. Even if OAOs are foreclosed to some extent, eircom would still be in close competition with UPC.

– **OAOs** could face access discrimination subject only to ex post competition law rulings. For OAOs, the risk in the event of discriminatory conduct is that the ex post intervention could arise after the harm has occurred. In a (still) growing market where customer lifetimes are long and switching costs relatively high, the harm of potential foreclosure

would manifest itself over a long period of time—in terms of profits that OAOs would have achieved in the absence of the infringement.

– **Consumers**—eircom would have more flexibility to compete with UPC in the short term (ie, it could adjust its pricing without ex ante constraints on economic space). This could provide consumer benefits in the short term, given that eircom could match or undercut UPC's price, which in turn could put more pressure on UPC. However, it is not clear whether eircom would actually price below UPC's offerings and, if so, to what extent. A relatively large proportion of eircom's customer base may not be sensitive to small changes in pricing (to the extent that its customer base comprises many loyal 'non-switchers'). eircom's incentives to compete fiercely on price may be diluted insofar as the cohort of customers who are likely to respond to price changes is limited. In the longer term, if the OAOs do not achieve sustainable scale, the retail market may become duopolistic (eircom and UPC). This in turn may result in consumer harm due to higher prices and lower quality.

A1.2.2 Stage 2: Margin squeeze test or cost-plus

A margin squeeze test allows the incumbent to respond to the competitive retail pressure from alternative platforms. The remedy is responsive to changes in market conditions and is not constrained by complexities associated with cost uncertainty—in particular, the valuation of legacy network assets. Assuming that the retail pricing constraint is effective in ensuring that retail prices are competitive, an ex ante margin squeeze test is sufficient in ensuring that entry is possible at prices that are consistent with the outcome of competitive process.

Counterfactual 2: cost-plus pricing

The following implications seem likely.

– For the **incumbent**, a cost-plus wholesale pricing approach implies significant uncertainties with respect to the assumptions, given the cost and demand uncertainty; alternative applications of the cost standard will result in differing wholesale access charges, and, by implication, different constraints on the ability to match competitor prices in the retail market. A wholesale access charge that is too low hinders investment recovery and could deter further investments. A wholesale access charge that is too high would constrain eircom, particularly where there is alternative platform competition (from UPC), provided that the incumbent still has to comply with the margin squeeze test. eircom could, of course, price below the ceiling, but a 'too high' cost-based charge would risk sending wrong signals to the market players, as well as external investors, on what is actually a cost-reflective tariff.

– For an **OAO**, the choice of cost standard and the resulting wholesale price will have implications for entry signals. High wholesale access charges may deter entrants from their initial investment or from expanding investments deeper into the network. Similarly to eircom, OAOs are also likely to be constrained in the retail market by cross-platform competition. In effect, the entire platform, including eircom and OAOs, would be constrained by a too high or too low access charge.

– For **consumers**, this methodology could hinder NGA competition (and subsequent market outcomes) where wholesale costs are set too high. Welfare benefits that may arise from NGA-based products and services could fail to materialise if a cost-plus regime deters investment.

It is also noted that, given the complexities associated implementing a cost-plus regime (even if undertaken on a 'top-down' basis), the regulatory burden of modelling costs is likely to be more significant than it would be under the margin squeeze test system.

A1.2.3 Stage 3: Implications of different assumptions of the margin squeeze test

The base-case margin squeeze test is specified as described in Table 6.1 in the main report—ie, SEO, DCF, portfolio, forward-looking LRAIC(+).

The SEO approach assumes that entrants are currently not likely to be as efficient as eircom. This is because entrants cannot achieve the same scale, although it is recommended that an EEO approach be employed once the OAOs have achieved sufficient scale, or following a glidepath, in order to encourage efficient entry. The DCF approach to price-setting captures some of the NGA cost uncertainties and allows the incumbent to transfer some risk. The portfolio level of aggregation allows the incumbent the flexibility to price-discriminate efficiently on individual products. The LRAIC(+) cost standard allows recovery of the relevant common costs, yet to a lesser extent than ATC. The DCF approach for VUA products may allow entrants greater retail pricing flexibility via lower variable per-line costs.

This combination of assumptions is considered to provide eircom with sufficient flexibility in its retail pricing (in order to meet competition with UPC). The OAOs, on the other hand, have ex ante-defined economic space on NGA products.

For consumers, this methodology could balance the investment recovery with efficient entry and downstream competition. There may be incremental benefits of price discrimination and flexibility where this promotes more efficient delivery of products and services. Where risk-sharing pricing regimes are in place, the lower risk may facilitate larger NGA investment than the counterfactuals.

Counterfactual 3: margin squeeze test with alternative assumptions

In general, alternative assumptions within the margin squeeze test remedy could change the size of the retail space or alter the flexibility of actions for parties in the downstream market. A larger economic space in the presence of competition from an alternative platform is likely to imply low wholesale access prices.

– For **eircom**, a larger economic space between products is likely to mean easier entry potentially by an inefficient operator. If retail prices are constrained, the low wholesale charges could undermine the recovery of investment. Changes to assumptions that limit the incumbent's pricing flexibility are likely to harm eircom's ability to match retail prices of alternative platform providers.

– For an **OAO**, a larger retail space is likely to promote further entry, but may also reduce the incentives to become more efficient or to move up the ladder of investment. Alternative assumptions (ie, no DCF) that are not compatible with a risk-sharing VUA price structure might result in less pricing flexibility and product innovation in the retail space.

– For **consumers**, changes in the economic space of wholesale NGA products are likely to have implications for the intensity of downstream competition. To the extent that investment incentives are altered, this could affect the size and extent of NGA deployments.

In summary, the implications of specific alternative assumptions are as follows.

– **EEO versus SEO**. The EEO assumption for the margin squeeze test will imply that entrants could achieve similar economies of scale in their retail units as the incumbent. EEO is likely to assume lower retail costs for the incumbent, thereby allowing eircom to set a higher wholesale access charge. This would make entry more difficult for entrants, but may incentivise them to invest in their own infrastructure. For the incumbent, the EEO assumption is likely to reduce competition in the retail market and/or increase its return from the supply of wholesale services. For consumers, this change is likely to result in (marginally) higher prices and less choice.

– **LRAIC(+) versus ATC**. The LRAIC(+) standard in the margin squeeze test assumes that the retail cost of a product is the incremental cost that would be avoided if the product were no longer provided. This includes all fixed costs and some common costs where relevant. ATC would include the costs of LRAIC(+) and some additional common costs. The ATC assumption would therefore widen the economic space, and may promote further entry. For the incumbent, the increased retail competition could reduce profits and a lower wholesale price may harm the recovery of investment costs. For consumers, the additional competition may reduce prices or improve choice; however, marginal changes to investment incentives may reduce the size and scope of the NGA network.

– **Aggregation by portfolio versus product-by-product**. A margin squeeze test that applies to an overall product portfolio allows the incumbent flexibility in its retail pricing. This is likely to imply discounting on products where the competition is most intense. This flexibility may mean that the incumbent can price-discriminate, which may improve efficiency, and can be welfare-maximising under certain conditions. A product-by-product margin squeeze test would ensure sufficient economic space for each retail NGA offer. This could enhance entry and competition, particularly for entrants that may lack economies of scope. For consumers, there may be some gains from improved competition of a product-by-product approach, but these may be offset by a reduction in efficiency. The harm to consumer welfare of the portfolio approach may be minimal, provided that, overall, it satisfies a net revenue test (although this depends on the proportion of the overall broadband base in any particular bundle).

A2 Regulation of NGA in the EU

Table A2.1 Regulation of access products (ODF unbundling)

Country	Availability	Current regulatory obligations	Costing issues	Pricing
Austria	Not available, because fibre is not included in Market 4 in Austria			
Belgium	Not available			
Czech Republic	No wholesale NGA products			
Denmark	Not available on a mandated basis			
Estonia	Not provided			
Finland	Not available			
France	Not available			
Germany	Mandated. Since FTTH infrastructure hardly exists (the incumbent has just started the roll-out), there is currently no demand for ODF unbundling	New remedies decision on Market 4 not yet in force. The following obligations will be in place in future: transparency obligation (fairness, reasonableness and timeliness); non-discriminatory and transparent reference offer; non-discrimination obligations; access obligations	Fibre lines: ex post rate regulation (eg, margin squeeze test)	
Greece	Not available			
Hungary	No actual obligation yet			
Ireland	No specific NGA remedies were mandated, although general principles were adopted	Transparency; non-discrimination; access obligations; accounting separation	Will be subject of future consultation	Will be subject of future consultation
Italy	Obligations in Market 4 still under discussion			
Latvia	Not available			
Lithuania	Not applicable (analysis of Markets 4 and 5 is not finished)			
Malta	Not available			
Netherlands	In the market analyses (finalised December 2008), the unbundled fibre service (ODF access) is defined in the same market as unbundled local-loop services (MDF and SDF access). KPN and its joint venture, Reggefiber, have been identified as market players with SMP for this wholesale market. Based on this SMP, an access obligation applies for Reggefiber for the non-discriminatory provisioning of ODF access and the ancillary services: collocation and backhaul			
Norway	Not mandated			
Poland	Mandated (planned)	Proposed measures: reference offer; transparency; non-discrimination; access obligation	Cost model (Art. 13 of Access Directive, AD)	Art. 13 of AD (charges based on costs incurred)
Portugal	No mandated fibre unbundling			
Romania	Not available (voluntary or mandated)			

Country	Availability	Current regulatory obligations	Costing issues	Pricing
Slovak Republic	No NGA wholesale products			
Slovenia	Mandated for the SMP operator only, due to the market analysis notified in November 2010 (finalised and expected in early 2011)	Obligations will be imposed with the final measure: access obligations in relation to fibre loops; transparency obligations in relation to fibre loop unbundling. The reference offer will also have to contain conditions for access to the fibre loops; non-discrimination obligations in relation to fibre loop access, obligation of accounting separation	LRIC	LRIC-based prices
Spain	Not available			
Sweden	Available on a mandated basis	Transparency, reference offer, non-discrimination, access obligations	LRIC, non-discriminatory pricing	not applicable
Switzerland	Regulated offer available for copper local loop. No regulated offer for fibre local loop	Cost-based price regulation with collocation obligation	LRIC	Not available
Turkey	No ODF unbundling regulation			
UK	Not available at June 30th 2010 (and not mandated since then)			

Table A2.2 Access products (active)

Country	Availability	Current regulatory obligations	Costing issues	Pricing
Austria	Not available			
Belgium	Mandated	Reference offer; changes to be approved by NRA (transparency)	Cost-oriented, LRIC bottom-up model For WBA, VDSL2 additional mark-up to obtain reasonable pricing	Stable tariffs during transition period (while closing MDFs)
Czech Republic	No enhanced bitstream products			
Denmark	Mandated	Transparency, reference offer, non-discrimination, access obligations	LRAIC	LRAIC. Same pricing models in Markets 4 and 5 to ensure consistency
Estonia	Mandatory	Access, non-discrimination, transparency (including a reference offer) and cost accounting obligations (margin squeeze test)	Price cap	Not available
Finland	Not available			
France	Not available			

Country	Availability	Current regulatory obligations	Costing issues	Pricing
Germany	Telekom Deutschland GmbH has offered VDSL on a voluntary basis since 2009. Since 2010 a new remedies decision for bitstream has been mandated including VDSL and FTTH/B infrastructure	Transparency obligation. Reference offer (mandated for Layer 2 and Layer 3 bitstream, already provided for Layer 3 bitstream access); non-discrimination obligations; access obligations	New Market 5 remedies decision (in force since September 17th 2010): ex post regulation for IP and ATM bitstream	The new Market 5 remedies decision replaced ex ante pricing obligation with an ex post pricing obligation for Layer 2 and Layer 3 bitstream access
Ireland	Current market analysis on Market 5 is still work in progress			
Italy	AGCOM is in the process of defining relative implementation issues			
Latvia	Not available			
Lithuania	Available on a voluntary basis	Market 12 is not regulated	Not applicable	Not applicable
Malta	Not available			
Netherlands	The wholesale broadband market consists of the market for low-quality wholesale broadband services (sometimes referred to as consumer bitstream) and the market for high-quality broadband services (sometimes referred to as business bitstream)			
Norway	VDSL2 bitstream available from December 1st 2010. Mandated	Access, non-discrimination, transparency (including a reference offer), accounting separation	Historical costs in the accounting separation reporting	No price regulation
Poland	Mandated	Proposed remedies: reference offer; transparency; non-discrimination; access obligation	Cost model (Art. 13 of AD)	Art. 13 of AD (charges based on costs incurred), price control obligation
Portugal	Mandated for copper/DSL; there is no mandated bitstream over fibre	No company has SMP in competitive areas. All obligations imposed on Portugal Telecom (in 2005) were removed	Cost orientation of prices and margin squeeze test	Cost orientation of prices. No upfront payments or volume discounts exist
Spain	Mandated	Transparency; non-discrimination; reference offer; access obligation for copper and fibre	Cost orientation	Under study for the new enhanced service
Sweden	Available on a mandated basis	Transparency, reference offer, non-discrimination, access obligations	LRIC	Not available
Switzerland	Regulatory bitstream access is offered from the central exchange	Utilities will provide non-discriminatory access on Layer 2	Not available	Price for regulatory bitstream access is CHF26.60–29.10/month, including phone line

Country	Availability	Current regulatory obligations	Costing issues	Pricing
UK	Available on a voluntary basis from June 30th 2010 (mandated on October 7th 2010)	Transparency obligation (notifying changes in charges and terms and conditions; notifying technical information); availability of reference offer (including contents and processes for updating); non-discrimination obligations (strict no discrimination requirement); access obligations (product will be available for both FTTC and fibre-to-the-premises (FTTP) deployments)	No obligations on costing for mandated product	No notable pricing features at this point; no regulated controls on prices

Source: BEREC.

Park Central
40/41 Park End Street
Oxford OX1 1JD
United Kingdom

Tel: +44 (0) 1865 253 000
Fax: +44 (0) 1865 251 172

Stephanie Square Centre
Avenue Louise 65, Box 11
1050 Brussels
Belgium

Tel: +32 (0) 2 535 7878
Fax: +32 (0) 2 535 7770

200 Aldersgate
14th Floor
London EC1A 4HD
United Kingdom

Tel: +44 (0) 20 7776 6600
Fax: +44 (0) 20 7776 6601

www.oxera.com