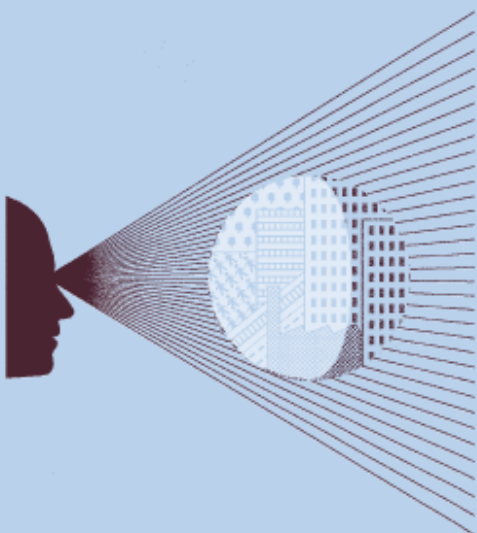


How a co-investment model could boost investments in NGA networks

Feasibility and implementation of a co-investment model

Prepared for Vodafone

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Executive summary

Objective

The revised European Framework Directive imposes a new duty on national regulatory authorities (NRAs) to ‘promote efficient investment and innovation in new and enhanced infrastructures’.¹

While other regulated network industries, such as energy, water and rail, have long-standing investment objectives, this is the first time that such an EU-wide investment duty has been assumed by telecoms regulators at a time when the European Commission’s ‘Digital Agenda for Europe’² envisages substantial new investments in telecoms assets, particularly next-generation access (NGA) infrastructures.

Broadly, there are three approaches to regulating investment in regulated industries. Regulators can:

1. allow the market players to make decisions about investment and technology migration, while the regulator confines itself to intervening (if necessary) to ensure effective competition over the infrastructure after that investment has taken place. Broadly speaking, this has been the European telecoms regulators’ approach to date;
2. take a more interventionist role, determining regulated prices that generate a ‘fair’ rate of return on an approved level of capital expenditure (CAPEX). This approach, used by regulators in regulated utility sectors in many countries, is suitable for sectors where demand risk is relatively low, and where customers exhibit relatively low responsiveness to changes in prices or income, as in essential services such as water and energy;
3. adopt a process in which the industry and the regulator agree the long-term investment objectives for the sector, with the regulator providing long-term regulatory certainty over the treatment of investments made in line with that process and objective. This has been the approach of a number of regulators in the aviation and rail sectors.

If European telecoms regulators continue to apply the first approach, and see their role as solely or principally regulating market outcomes as and when they occur, then it seems likely that the current gradual and uncoordinated transition from copper to fibre networks will take place, and that targets set by the European Commission’s Digital Agenda for broadband coverage and take-up by 2020 will not be met.

The second approach requires NRAs to take very detailed decisions about the level, timing and technology for industry investment. This is a challenging task, even in the relatively stable regulated network utility sectors, and is unlikely to be appropriate in a technologically dynamic market such as telecoms. Given the inherent uncertainty surrounding future demand and the progress of telecoms network technologies, it seems regulators are unlikely to be willing to take the responsibility for deciding on the specific forms and levels of investment on which a fair return can then be earned.

This report therefore focuses on the third option, which would represent a significant, but achievable, change in approach, allowing for a more coherent framework for fibre investment

¹ Article 8(5)(d) of the Framework Directive.

² Kroes, N. (2011), ‘Investing in digital networks: a bridge to Europe’s future’, Speech 11/623, October.

in Europe. Based on an assessment of the economic case for co-investment, this study describes the practical implementation of such a model (which is referred to as 'NetCo').

Underinvestment problem

The Digital Agenda identifies the development of the information and technology sector in general, and NGA investment in particular, as drivers of European economic growth and productivity:

Europe needs to focus efforts in sectors that provide direct sources of growth, now and in the future. It is clear, more than ever, that information and communication technology is one of the sectors with the greatest potential to create jobs, increase productivity growth and boost our competitiveness. Studies show that the productivity leaders in Europe are those countries who have invested in, and made best use of, ICT. Already, the sector contributes half of Europe's productivity growth. Over just ten years, if we get it right, broadband development could give Europe over one trillion Euros in additional economic activity, and create millions of jobs. An increase in broadband penetration of 10 percentage points would increase Europe's annual GDP growth by between 0.9 and 1.5 %. That's why investing in ICT is investing in a competitive future: the Europe of tomorrow is digital. Or to put it another way – can we imagine a prosperous, confident Europe in 2020 that is not digital?³

The Digital Agenda specifies a target for Internet coverage at speeds of over 30Mbps for all EU citizens by 2020, with half of EU households subscribing to connections at speeds of over 100Mbps. Networks capable of delivering this service level are commonly referred to as next-generation access or next-generation networks (NGAs or NGNs). Achieving this target via upgrades to the fixed-telecoms network will require large-scale capital investment estimated at around €268 billion.⁴

Current NGA coverage and the announced investment plans for the future will not meet these EU objectives.⁵ The European Commission has indicated that it is willing to consider innovative regulatory approaches and models in order to promote investment in NGAs. One aspect of the current proposals is to revisit pricing principles, making the roll-out of fibre services more attractive by gradually lowering the access prices for legacy copper networks.⁶ Other initiatives, such as the recent 'CEO Roundtable', have also featured extensive discussion of co-investment, risk-sharing and other innovative regulatory and investment models.⁷

A number of features of NGA make investment particularly challenging:

- **demand uncertainty**—future demand at the industry level ('market size') and firm level ('market share') cannot be forecast with certainty. Demand uncertainty is present in a number of markets, but is particularly problematic when the upfront investment is substantial and the sector is subject to regulatory intervention after the investment has been sunk;
- **willingness to pay**—even if the overall demand for NGA could be forecast, there is a large variation among customers' willingness to pay for the additional benefits of NGA. A

³ Kroes, N. (2011), 'Investing in digital networks: a bridge to Europe's future', Speech 11/623, October.

⁴ European Commission (2010), 'European Broadband: investing in digitally driven growth – Communication from the Commission to the European Parliament, the council, the European Economic and Social Committee and the Committee of the Regions', September 20th.

⁵ The question of whether or not the Digital Agenda targets themselves are set at an appropriate level is not addressed in this report. Rather, the targets are taken as given and the assessment focuses on the extent to which the NetCo proposal could overcome the market features which are currently preventing the investment necessary to meet those targets.

⁶ European Commission (2011), 'Questionnaire for the public consultation on costing methodologies for key wholesale access prices in electronic communications', October 3rd.

⁷ A summary of the CEO Roundtable discussions, held in spring 2011, is available at: http://ec.europa.eu/information_society/newsroom/cf/itemdetail.cfm?item_id=7211.

high degree of both retail and wholesale price discrimination is likely to be necessary to meet demand in an economically efficient way.

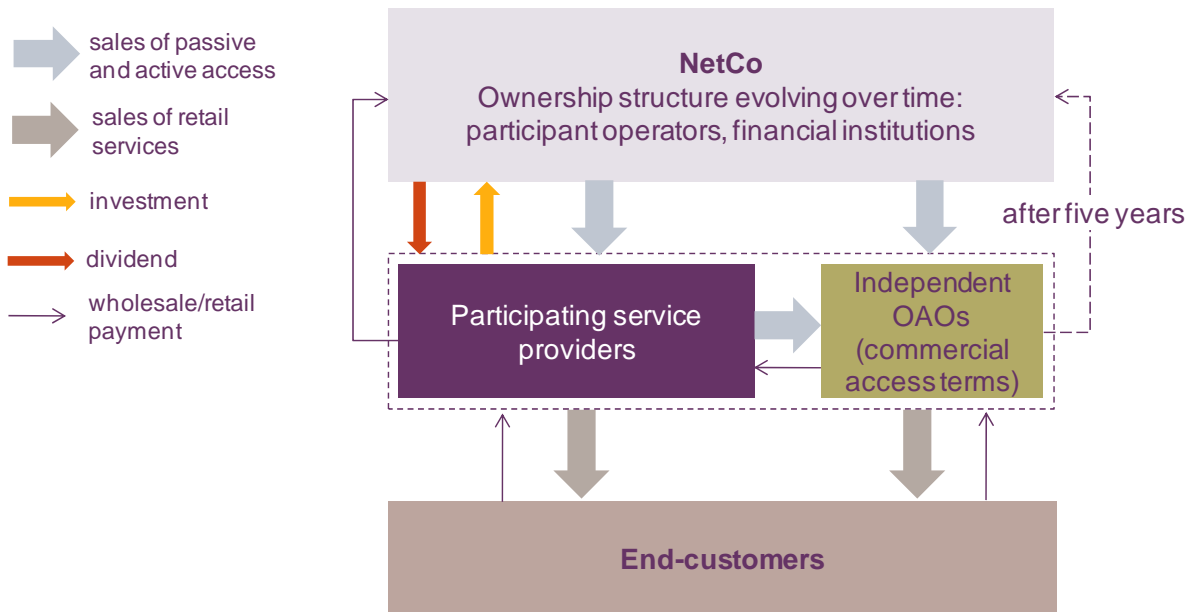
- **regulatory uncertainty**—telecoms markets are highly regulated and the regulatory framework frequently changes. As a result, investors might be reluctant to invest today for fear that in the upside—ie, an outcome that exceeds the central expectations—the resulting high returns might be clawed back by new regulation;
- **cost characteristics**—investment in NGA networks is largely fixed, sunk and unprecedented in nature. This discourages investment by both incumbents (which fear that their existing assets could become stranded and their construction costs could run out of control) and entrants (which, in addition to the stranding and cost control issues, fear that they will not be able to provide services that are competitive with those of the incumbent, should their fibre investment be duplicated);
- **cannibalisation of existing copper returns**—large-scale fibre investment will adversely affect the current copper returns of the incumbent most. It is, at the same time, in the best position to make that fibre investment;
- **external benefits**—some of the benefits of fibre networks are not appropriated by investors (they cannot be charged for). As a result, investment projects that might be beneficial from the social perspective might not be undertaken because the private returns are not sufficient to cover the costs.

How the NetCo model could address the underinvestment problem

NetCo would be a structurally separate commercial network entity mainly supplying passive fibre access (unlit fibre loops)⁸ and primarily owned by its participant operators (service providers), including both independent access seekers and the incumbent. For the first five years it would supply these inputs only to its participant operators. Other alternative operators (OAOs) could purchase active services from any of the participant operators or, after the initial period of five years, fibre loops from NetCo on commercial terms. A stylised illustration is given in Figure 1.

⁸ Participant operators would maintain their own core and backhaul networks. Any sharing of these assets would take place outside the NetCo model.

Figure 1 Stylised illustration of the NetCo model



Source: Oxera.

Oxera considers that NetCo could address many of the market features that currently hinder investment in fibre-access networks in Europe, by:

- reducing the prospect of duplication of networks, and hence lowering the firm-level demand risk faced by investing operators;
- achieving long-term commitment from all stakeholders, including the regulator, which would be more likely to commit to an industry structure with several downstream operators and where the incentives for behaviour that distorts competition are reduced;
- achieving greater alignment of incentives and coordination among market participants in order to maximise network coverage.

These mechanisms are summarised below.

NetCo could reduce firm-level demand uncertainty

To reduce demand uncertainty, participating service providers would:

- **commit to decommission (or integrate, if feasible) existing networks in exchange for compensation:** this relates in particular to existing copper networks, which would be decommissioned under the NetCo model. This removes the risk that retail customers could choose to maintain lower-quality services on a remaining, independent, copper platform, and thus the risk that competition between the (old) copper and the (new) fibre will bid the price down to marginal costs. NetCo would also seek to incorporate and provide compensation for the fibre networks already built by its participant operators;⁹
- **commit not to invest in alternative fixed access networks while they are NetCo investors:** this relates to the threat that investors could otherwise reduce their reliance on NetCo by ‘cherry-picking’ and self-building in those dense areas with lower costs than the average NetCo cost, which would be spread over a larger footprint. This would also provide reassurance to all parties that the investors are ‘tied in’ as wholesale

⁹ In principle, this could include cable networks, but the technical difficulties of incorporating cable technology within NetCo is not addressed further in this report.

customers of NetCo for the long term. Investment in other types of access networks (eg, wireless) would not be subject to this restriction.

These commitments would reduce (but not eliminate) demand uncertainty for investors by ensuring that the customer base across which the fixed and sunk costs of setting up a fibre network are spread is as broad and stable as possible, throughout the period of the investment. The larger the share of the overall market participating in NetCo, the more significant the reduction in demand uncertainty associated with the potential duplication of the access network assets.

NetCo could provide incentives for long-term regulatory commitment

A fundamental requirement of the NetCo model is that key elements of the regulatory regime should be defined *ex ante* and maintained *ex post*. This would require commitment from the regulators that they would not change the rules of the game after the NGA investment is undertaken (and sunk). To allow regulators to do this, the NetCo model is designed to ensure that there would be a sufficient number of providers competing in the downstream part of the value chain.¹⁰ The principle of allowing lighter or no significant market power (SMP) regulation to a co-investment scheme is consistent with the European Commission's NGA Recommendation.¹¹

NetCo could mitigate cost risks

The NetCo model has been designed to ensure that the NGA cost characteristics (sunk, fixed and unprecedented) do not deter investment. For example, the fixed-cost problem would be partly addressed by establishing an entrants–incumbent partnership. This partnership would guarantee that all partners exploit together the scale economies of the network. The sunk-cost problem could be mitigated by reducing demand and regulatory uncertainty, thereby minimising the risk of asset stranding. It could also be mitigated through the creation of an industry structure that would allow for sustainable welfare-enhancing price discrimination at the wholesale, as well as the retail, level.

NetCo could deliver greater societal benefits

In the absence of commitment to a single large fibre-access network, each co-investor could attempt to invest only in the more profitable urban areas, leaving the less profitable areas unserved. The ability to differentiate pricing according to customers' preferences and regional cost differences should allow greater network coverage to be built under the NetCo model.

Given the mechanisms described above, the NetCo model would be expected to result in greater privately funded NGA coverage than could be achieved under the counterfactual (*status quo*). In rural areas where there is no business case for NGA deployment, even under the co-investment model, public funding could still be warranted. This rural build-out could draw on the established processes, know-how and operational ability of NetCo to deliver extra coverage at the lowest possible cost.

Design of the NetCo model: Oxera's approach

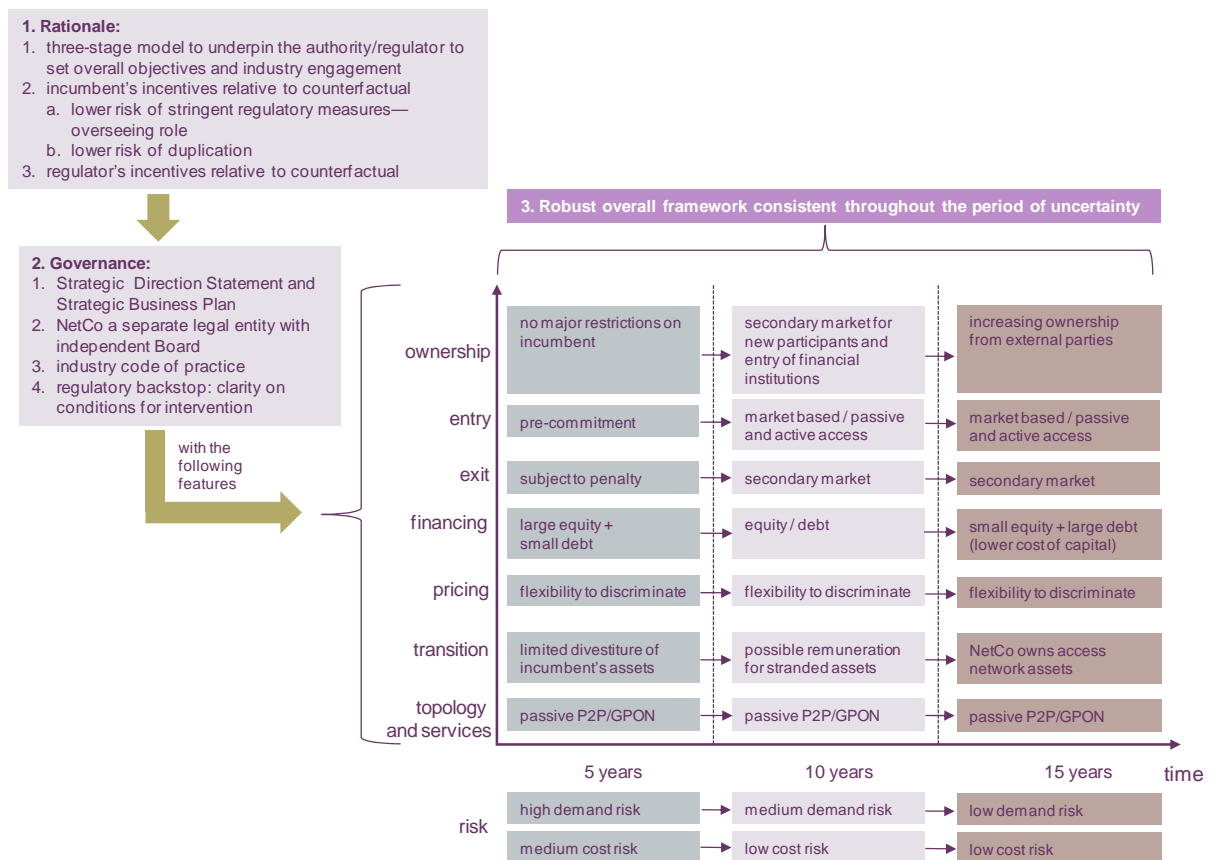
The NetCo model presented in this report is designed to achieve regulatory time-consistency and to be robust across the different phases of network roll-out, and over the evolution of

¹⁰ These characteristics of NetCo address the issues of downstream competition as well as price and non-price discrimination. There is a separate issue of potentially excessive pricing by NetCo which could be addressed by an *ex ante* 'safety cap' on NetCo's overall return on capital, described further in the main body of the report.

¹¹ European Commission (2010), 'Commission Recommendation of 20 September 2010 on regulated access to Next Generation Access Networks (NGA)', September 20th, paras 27 and 28. The European Commission included even more explicit guidance in the consultation document on the circumstances under which a co-investment model does not warrant cost orientation. European Commission (2009), 'Draft Commission Recommendation of [...] on regulated access to Next Generation Access Networks (NGA)', June 12th, Annex III.

demand conditions. The overall framework, which underlies the design of the specific model attributes, is illustrated in Figure 2.

Figure 2 A schematic representation of the overall approach



Source: Oxera.

The model design consists of three broad elements:

- **the rationale**—this builds on the analysis of the market features that currently hinder fibre investment, with the aim of incentivising the various stakeholders to engage in the process in order to achieve the overall investment objectives;
- **alignment of incentives between stakeholders**—central to the NetCo model is its legitimacy, which is achieved through a governance structure comprising the four main features presented under 'Governance' in the figure above;
- **practical implementation**—a clear approach is set out to various issues that would need to be addressed to put NetCo into operation, including risk, ownership, entry and exit, financing, pricing, migration from legacy environment, network topology and the services provided by NetCo. The design of these aspects recognises the dependencies between them, as well as the evolution over time of the supply and demand characteristics of the market.

1. Rationale for NetCo

Central to the implementation of the NetCo model is a clear articulation of the mechanisms through which the model could, if implemented appropriately, result in market outcomes that benefit stakeholders in general (including, most importantly, end-users) relative to the counterfactual or status quo. Agreement on the fundamental objectives requires engagement

and commitment by all stakeholders, including the relevant public bodies (the European Commission, national governments and NRAs).

The ‘no NetCo’ counterfactual

NetCo’s attractiveness to the various stakeholders will be influenced by their assessment of the competitive and regulatory system which will arise in the ‘no NetCo’ scenario. This ‘base case’ is:

- a continuation of the status quo in most European countries, or relatively limited and defensive incumbent deployment of fibre in response to cable competition;
- some relatively small-scale alternative operator deployment of fibre, particularly in areas where infrastructure access makes roll-out less costly;
- continued application of three-yearly market reviews, SMP analysis and the application of regulatory remedies in line with the NGA Recommendation.

It is not the function of this report to detail the ways in which this base case could change. However, it seems reasonable to assume that lower regulated copper charges, low-cost and effective duct access for alternative operators, more stringent enforcement of non-discrimination obligations and/or imposition of stricter regulatory remedies including functional separation, would each significantly affect the standard against which stakeholders—including incumbents and entrants—would judge the NetCo proposal.

Incumbents’ incentives

Against the base case, significant participation by the incumbent is taken as a prerequisite for the NetCo model to work; not only because of its financial resources and existing customer base, but also because it owns the current (fixed) infrastructure, some of which (eg, existing ducts) is likely to be needed to build NetCo in an economic manner. Clearly a co-investment model would represent a considerable change to the industry, and in that process, there would be costs and benefits to all players. In particular, the incumbent operator would prefer the NetCo model only if it would be better off participating in NetCo than in the future position it thinks it can achieve as a vertically integrated supplier of NGN services to its end-customers and NGA wholesale services to its (downstream) competitors.

The main benefits for the incumbent resulting from successful design and implementation of the NetCo model, compared with deploying fibre on its own, would be the following.

- **Consistent and committed regulatory framework**—given that, by construction, the NetCo model would ensure a more competitive industry structure at the retail level and likely elimination of anti-competitive discriminatory practices at the wholesale level, regulators would be more likely to commit to long-term rules than under the status quo, in which a single vertically integrated incumbent will be subject to regular market reviews and pricing interventions.
- **Pricing flexibility**—NetCo would be able to price-discriminate in order to reflect more closely (retail) customers’ willingness to pay (‘value-based’ pricing), as well as geographical differences in network costs. Enabling price discrimination of this sort is likely to be more controversial under status quo arrangements.
- **Lower risk of duplication and overbuild**—the incumbent would benefit from the fact that a larger share of the industry participants would de facto commit to a single fibre network, which in turn implies a reduction in firm-level demand risk for all parties.
- **Benefits from the broader fibre network coverage**—under the NetCo model, all service providers would benefit from a greater ability to provide advanced services in the retail market and differentiate retail offerings (including content and applications). The investment in NGA may not materialise to the desired extent under the status quo regime and all parties would be likely to be worse off as a result.

- **Avoided costs of dual running**—the pricing flexibility described above would enable NetCo to provide a low-cost ‘telephony only’ fibre service. This, combined with widespread industry participation in NetCo should make the coordinated migration from copper to fibre more rapid and less costly. Incumbents would receive an element of compensation from NetCo for the early closure of their copper network.

The prerequisites for such an outcome are pre-commitment and regulatory certainty over time, without which the other benefits would not materialise in full, or at all.

Entrants’ incentives

Entrants’ incentives to engage in the NetCo model stem from many of the same factors as above. Extended network coverage, lower total industry costs (and hence lower average unit costs), and the resulting greater scope for innovation and product differentiation in content and applications layers, are of equal relevance to all parties. In addition, partial ownership of the access network operator could result in gains to entrants that would not be available to them under the status quo, as follows.

- The NetCo model, with its governance features and detailed design characteristics, would mitigate the incentives to discriminate in wholesale access processes compared with the current model of a single vertically integrated incumbent. The current regulatory framework has not produced a level playing field in many of the Member States, mainly because of non-price discrimination in the supply of wholesale inputs to the competitive downstream markets.
- By investing in NetCo, entrants would gain the opportunity to invest in a more attractive fibre asset than the far riskier ‘self-/over-build’ option.
- Increased clarity in regulation (the threshold of intervention) and less ex ante regulation overall could be beneficial relative to the current system, which entrants may perceive as burdensome and unpredictable.

Under the status quo, entrants have the opportunity to ‘wait and see’ if the investment pays off without having to commit upfront. They can rely on access regulation post-investment. Given this, entrants would be likely to join NetCo only if there were sufficient assurance that discriminatory practices would be prevented. This requires a robust governance structure, to address any potential concerns resulting from the incumbent’s relatively high ownership share and its position as NetCo’s largest customer (at least during the initial stages). This type of provision is quite common in this form of investment scheme, characterised by large asymmetries among initial investors.

Regulators’ incentives

Of particular interest to investors is the regulatory uncertainty issue. For the owners of the existing copper networks, the incentive to invest in NGA networks depends on whether there is a regulatory framework that allows an appropriate return of, and on, the investment to be made, taking account of the uncertainty in that investment at the time it is made.

Regulators are likely to recognise that regulatory commitment is needed to incentivise investment in NGA networks. It would also be in the regulators’ interest to have an industry structure that does not, by construction, incentivise any of the operators to undertake anti-competitive discriminatory conduct.

Under the current industry structure, regulators are unlikely to commit to relaxing regulatory measures in the long term. Vertically integrated incumbents may have limited incentives to provide any third-party access at all on a voluntary basis. By contrast, in the NetCo model, the regulator would pre-commit to an industry structure that includes an appropriate number of service providers in the downstream market (which are also NetCo’s owners, rather than NetCo being an independent upstream entity), together with an industry code of conduct and well-defined regulatory backstop. Regulators would still have the ability to intervene if NetCo

were to earn excessive returns in the long term, but the conditions under which they would do so would have to be clearly prescribed at the outset, taking into account the risks present at the time of the investment.

2. Governance of NetCo

The NetCo model builds on practical insights from the successes and challenges across a variety of sectors with large-scale investment programmes. This provides the platform to propose a set of practical steps that would better align the incentives of the incumbents, regulators and service providers in the industry, with a view to deploying the next generation of fibre networks.

The key features of governance of the NetCo model are summarised as follows.

Feature 1: the creation of a separate legal entity, NetCo, owned by a combination of the current owner of the copper network and a number of service providers. Such a legal entity would operate with an independent Board, which would appoint a chief executive officer (CEO) with a fiduciary duty to all investors, irrespective of their ownership stakes. The entity would be subject to the high standards of corporate governance which exist in the EU. Such ‘wholesale only’ entities are a common feature of energy markets.

Feature 2: a NetCo Strategic Direction Statement (SDS) setting out the vision for the market over a 20–30-year timeframe. This would provide the NetCo Board’s view of what the network access service looks like over a long period of time, and how such a service would satisfy the broad range of potential service provider customers and end-users of high-bandwidth services. The SDS would be underpinned by a Strategic Business Plan (SBP), detailing the inputs and outputs that NetCo would deliver. The SBP would be developed through extensive consultation with all stakeholders, *irrespective* of whether they are owners of NetCo or new entrants in the market.

Across the many sectors covered in this study (eg, aviation and rail), there is a clear trend for greater engagement by users in the business planning of the core network, to align the incentives of the network providers with the interests of users.

Feature 3: a Next Generation Industry Code of Conduct (NGICC) would form the basis for the technical features of the network, and would be supervised by an external party. This code would set the conditions under which NetCo engages with its customers (which are all wholesale customers) and the access terms for participating service providers and third-party entrants. Operating *ex post*, or in a subordinate way to the high-level regulatory framework, the NGICC would ensure compliance with the SBP and its associated investment plan and service-level agreement (SLA), and provide a platform to process any potential deviations from the original SBP. As described in further detail below, the code would determine the circumstances under which any disagreements between participants (or external parties) would be dealt with by an independent arbitrator. Variants of industry codes of conduct already exist in other network industries across the EU (notably in the energy sector).

Feature 4: a well-understood regulatory backstop would provide sufficient protection for smaller participants. This would comprise a set of principles which, if not met, could lead to intervention by regulators using existing instruments. The regulators’ role would focus on *ex post* monitoring of the arrangements.

These governance features set the basis for the design of the specific aspects of the model.

3. Design of NetCo

The specific aspects of the NetCo model discussed in the report are:

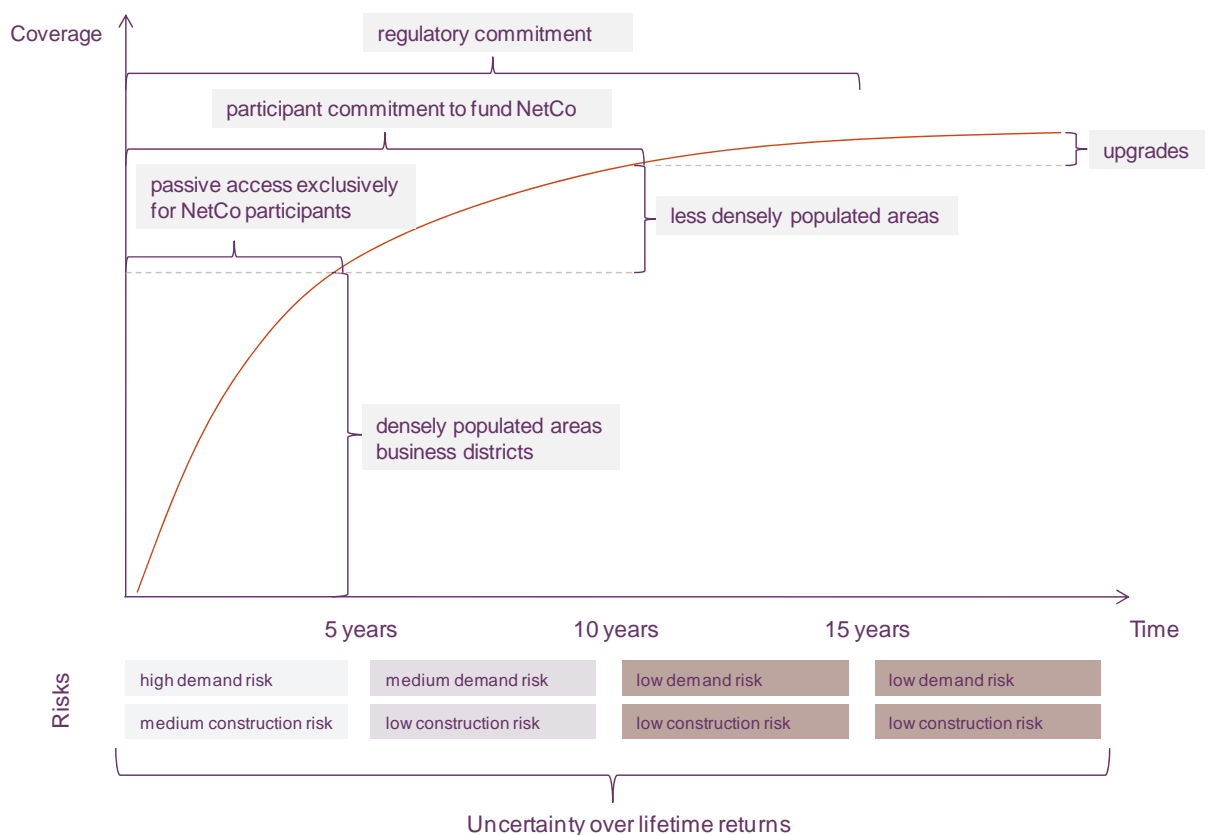
- stakeholder commitment;

- ownership and financing;
- entry and exit;
- pricing;
- transition and treatment of the incumbent's legacy assets;
- topology and services;
- regulation.

Stakeholder commitment

The economic case for NetCo relies on significant commitment by participating operators, investors and the regulator for a time period that is consistent with the period of demand uncertainty and construction risk, and takes into account the lifetime of the assets. As an illustration, Figure 3 gives an overview of the potential timeline of NGA passive network roll-out, and the evolution of the associated risk profile over time.

Figure 3 NGA passive network roll-out and evolution of risk profile over time—an illustration



Source: Oxera.

To achieve the required degree of commitment from the stakeholders, the following features are envisaged.

- **Long-term regulatory commitment for 15 years.** The less consolidated the downstream market is, the greater the regulator's ability to pre-commit. Hence, the incumbent would be more likely to achieve regulatory certainty through NetCo, which ensures downstream competition, than by itself, where vertical integration provides no such assurances. Specifically, the regulator would commit not to intervene unless there are breaches to the NGICC (which is designed to ensure non-discrimination) and arbitration is required.

Under the proposed model, the regulator would allow (but would not guarantee) NetCo to earn a reasonable rate of return over the lifetime of investment. NetCo's returns would

need to reflect demand uncertainty and construction risk inherent in NGA deployment. While the duration of the construction and demand risk varies by sector, it is helpful to compare the proposed timeframes with precedents from other sectors with substantial investment in long-lived assets. These periods are typically a minimum of ten to 25 years, thereby providing sufficient certainty to the parties making the investment.¹² Regulators would however be able to intervene, after an appropriate period, if NetCo were to earn manifestly excessive returns. The principles associated with such intervention would be defined before the relevant investment was committed.

- **Ten-year commitment by participants.** Participating operators would commit to the use of the NetCo platform. Their commitment (ie, meeting their proportion of NetCo CAPEX and operating expenditure (OPEX)) should be sufficient to allow time for the network to be constructed (ie, the period of high and medium construction risk). Thereafter, the commitment period could be informed by the time necessary to have a clear indication of whether the downside or upside scenario will be realised. In the upside, no commitment is needed (there is high demand and hence other operators can replace any exiting firms). In the event of the downside scenario, however, it would be necessary to have a scheme in place that minimises overall losses (NetCo would not provide capacity to external parties below the price it charges participants).

The commitment period should not be too long: participants might perceive the NetCo model as itself representing high risks if it were to preclude them from seeking to invest in alternative technologies, the capabilities of which are not yet known, but which may become viable solutions after 10–20 years.

- **Commitment to network roll-out plan.** To avoid the costs of maintaining parallel networks, all participants would commit to predetermined NGA roll-out.

Inefficient OPEX would be incurred in maintaining parallel networks unless all participants were to commit to predetermined NGA roll-out and necessary changes in topology. The losses associated with stranded DSL electronics of entrants are unlikely to be significant. However, the forgone revenues arising from accelerated switch-off of copper (relative to the counterfactual) would need to be recognised by some form of compensation arrangement between NetCo and the incumbent.

Ownership and financing

The following features would be central to the ownership and financing structure; these follow experiences in the financing of network industries where high levels of investment are required, from the perspective of investors, operators and regulators.

Staggered entry of heterogeneous investors:

- risk should be allocated among parties/stakeholders depending on their ability to assess and influence the outcome.¹³ Consistent with this, at launch, NetCo would be expected to be funded principally by operator–participants, given their ability to encourage demand and control risk best. Financial institutions would not be precluded, but may be more likely to invest at subsequent stages, once the construction phase is complete. (Although, operator–participants would, of course, be expected to fund their equity participation in NetCo via various indirect financial instruments relevant to their individual financial position);

¹² See the examples from rail, aviation, electricity transmission, distribution and supply, as well as gas transport and shipping, as described further in this report.

¹³ Irwin, T., Klein, M., Perry, G.E. and Thobani, M. (eds) (1998), 'Dealing with Public Risk in Public Infrastructure', World Bank Latin American and Caribbean Studies: Washington, D.C.

- as risk reduces over time, the investment scheme would evolve gradually into a purely commercial activity, where the ownership of equity stakes is no longer necessarily linked to presence in the retail sector. With the (significant) entry of purely financial investors (including pension funds) into NetCo’s capital structure, it would be appropriate to delink the entitlements to be able to purchase NetCo’s output directly (see below) from ownership stakes.

Financial returns derived from upstream and downstream operations:

- NetCo participants would earn a share of NetCo’s returns (dividend) over and above the returns each of the operators generates in the downstream market.

Evolving capital structure over time:

- the above discussion suggests that the capital structure of NetCo—and its cost of capital—would exhibit a dynamic profile, changing over the lifetime of the investment. This would optimise the risk–return profile of the investment and fully exploit the financing options available for the project—eg, by adjusting the level of reliance on debt over time, depending on changes in investors’ appetite for this type of instrument.

Entry and exit

Participants that are considered creditworthy commit to financing NetCo’s CAPEX and OPEX. Participants’ cash outflows to, and inflows from, NetCo would be proportional to ownership. For those NetCo services that are used, participants would pay NetCo the wholesale price. This price is determined by NetCo, the pricing of which is designed to recover its costs, and generate a rate of return commensurate with the risk of the investment. The key characteristics include the following.

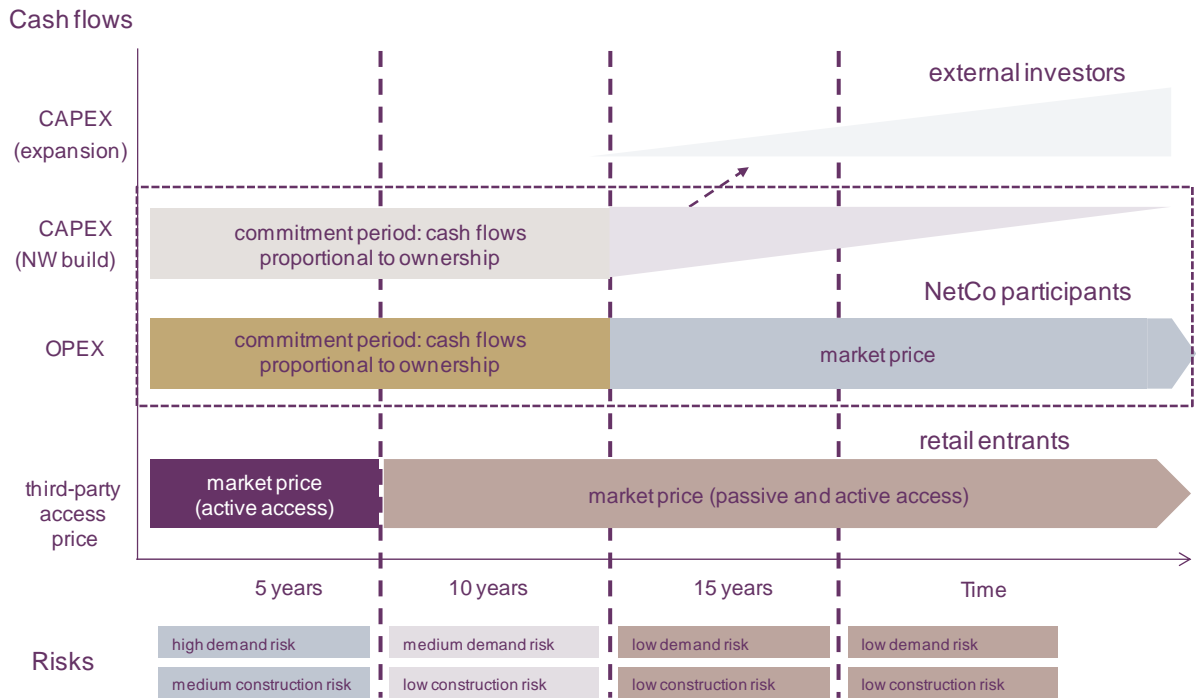
- If expected returns from NetCo are sufficient to incentivise enough bids when stakes are first auctioned, the ownership stake is not linked to the maximum share of NetCo output that the shareholder can purchase. Through a bidding process where the minimum stake is 10%, operator–participants commit to ten years’ funding of CAPEX and any start-up operational losses. The investment in NetCo allows them to purchase NetCo’s output. There is a steady cash outflow from participants to NetCo to fund the required CAPEX and OPEX (as set out in the SBP).
- If potential investors bid for more than 100% of NetCo, bids are scaled down proportionally, subject to maintaining the minimum share at 10%, if possible. If bids do not reach 100%, a new bidding round is instigated with access to NetCo’s output restricted to, say, twice the share of the equity owned.¹⁴ This refinement is designed to create an incentive for participants to take on an ownership share that is proportional to their overall usage of NetCo’s output.
- Third-party access is based on commercial terms negotiated between any NetCo participant and the third party in competition with the other NetCo participants. The commercially derived access prices are expected to enable the NetCo participants to recover at least their own input costs (ie, NetCo’s output prices) and any additional costs they incur in providing third-party access. NetCo does not provide direct access to third-party entrants during at least the first five years, which rewards early commitment to risky investment. NetCo itself sets its prices to generate returns to NetCo (and hence its investors).

¹⁴ An approach consistent with this has been employed by the gas transportation sector in Norway, where capacity allocation was limited to twice the owner’s equity interests. Brautaset, A.L. (2004), ‘The New Framework for Gas Transportation in Norway’, *European Energy Law Report*, 1, p. 21.

- After the initial ten-year period, external investors could purchase stakes from participating operators or could fund additional investments where further network expansion is considered worthwhile (subject to the agreement of the NetCo Board and in compliance with the NGICC). Consistent with the allocation of ownership at launch, investors that are willing to operate in the retail market would purchase at least a 10% stake.

Figure 4 provides an illustration.

Figure 4 Commitment and cash flows over time



Source: Oxera.

Pricing

To ensure maximum output in an uncertain environment, NetCo is allowed to price-discriminate to reflect end-users' willingness to pay and geographical differences in costs. Pricing flexibility would be manifested in the following ways.

- Two-tier/multi-tier pricing—to enable copper to be retired completely within NetCo's footprint, while minimising the price increase for those who do not wish to take up very high-speed services, it should be possible for the NetCo solution to enable the transfer/wholesale price of a connection for at least 'telephony only' to be less than 'high-speed' service (notwithstanding the fact that in a 'passive only' case, the facility that NetCo provides as an input to the service providers is the same). In addition, there should be no regulatory restriction on NetCo 'tiering' the price of its output within the high-speed category of use based on the speed of the end-service provided, as long as this does not distort competition in the downstream market(s). This would require NetCo to monitor or audit the end-services supplied by participating operators if NetCo remains a passive-only provider.
- Where active bitstream or virtual unbundling is provided, NetCo would be allowed to differentiate the wholesale product in terms of bandwidth in the way it considers most efficient, again, subject to the requirement not to distort competition in the downstream market(s). A tiered pricing structure has been introduced, for example, in Australia, where NBN Co is a structurally separated entity, similar to NetCo.

- Geographically differentiated pricing—to enable the maximum geographic roll-out, while avoiding the threat of overbuild, geographic averaging of prices should *not* be required. For ease of migration from national copper wholesale prices, NetCo may choose to average its prices but would not be obliged to do so.
- Participants could determine their own ‘wholesale’ prices independently—there would be no restrictions in participants’ ability to engage in wholesale sales of bitstream or virtual unbundling access where the output of NetCo is an input to that wholesale service (subject to taking the appropriate price from NetCo). In other words, participants could launch active access products on a commercial basis in competition with each other.

Any wholesale pricing structure agreed by NetCo that meets the requirements imposed on it should not subsequently be reviewable by the regulator within the period agreed.

Transition and treatment of the incumbent’s legacy assets

The legacy assets that can be used as inputs for NGA are, at least at launch, leased from the incumbent at cost-reflective tariffs. Insofar as some legacy assets become stranded relative to the ‘no NetCo’ counterfactual, reasonable ‘compensation’ may be considered and could be recovered through the pricing of NetCo’s outputs.

Initially, the incumbent and other participating operators divest all existing fibre-access assets within the proposed NetCo footprint by selling them to NetCo. The purchase price should be equal to the replacement cost (modern equivalent asset) value of the assets. At this point, the incumbent retains ownership of its existing copper assets. As copper assets are gradually replaced by fibre, NetCo buys out the incumbent’s copper assets. However, these purchases would be limited to those cases in which copper assets are necessary inputs for fibre-access services (ie, copper sub-loops where fibre-to-the-home (FTTH) is not feasible), and ‘compensation’ (if any) for the accelerated stranding of copper infrastructure where NetCo’s services make these assets redundant.

In areas where NetCo fibre is not deployed (ie, outside NetCo’s agreed footprint at any particular time), the incumbent continues to provide copper access on regulated terms. The incumbent leases to NetCo ducts and other passive inputs necessary for the development of the fibre network by NetCo within the agreed footprint area. These lease payments are part of NetCo’s OPEX.

Topology and services

NetCo would most likely deploy point-to-point networks; where alternative topologies already exist, or are otherwise preferable, NetCo would provide active access.

It is expected that NetCo’s assets would be predominantly passive fibre-access inputs (‘dark fibre’) and it would lease the underlying infrastructure (ducts, cabinets, buildings) from its current owner (in most cases, this would be the incumbent). Existing fibre-access network elements would be divested to NetCo at launch (from both the incumbent and entrants); over time, NetCo would gradually purchase other existing passive infrastructure required for NGA deployment.

The primary scenario is that each service provider is responsible for the ‘active’ communications equipment (electronics) and the retail services it chooses to provide. The choice of a point-to-point network that can be unbundled versus active ‘virtual unbundling’ access over a GPON (or possibly FTTC) network may ultimately need to be determined with reference to the existing assets, population density and topology of a particular country. However, it is possible that some degree of co-investment in active facilities might be favoured by some, or potentially all, of the NetCo participants. This would be a matter for discussion when establishing the SBP, but is not excluded from this model.

Regulation

The regulator's role is to commit firmly *ex ante* and to oversee the functioning of self-regulation. Where disputes arise, the regulator could be the first independent arbitrator. Circumstances under which the regulator would intervene would need to be specified *ex ante* in the NGICC, according to the following characteristics.

- If there are any proposals on NetCo's CAPEX and OPEX that are not in line with the SBP and are proposed by the majority (either one or more participants with a collective majority of equity), but not supported by all participants, they would be resolved through a resolution mechanism chaired by the regulator or an independent arbitrator.
- If there are complaints backed by evidence on discriminatory behaviour in wholesale processes—ie, if NetCo's performance in terms of key performance indicators is not consistent with the predetermined targets set out in SLAs.
- If NetCo's returns (internal rate of return) substantially and persistently exceed its cost of capital beyond a pre-defined excessive level.

In all, the design of these features builds on the objective to achieve regulatory time-consistency and to be robust across different phases of network roll-out, given the evolving demand and supply conditions.

Recommendations

The NetCo model described above would represent a significant, but achievable, change in industry engagement and, if implemented appropriately, a coherent framework for fibre investment in the EU. As set out above, the NetCo model is:

- an industry-led solution;
- designed to achieve high stakeholder legitimacy;
- risk-reducing;
- founded on practices already applied in other network industries.

In order for NetCo to be put into practice, the following recommendations are appropriate.

1. In order for the benefits of NetCo to materialise in full, and in line with the timetable set out in the Digital Agenda, timely actions are required from the industry and policy-makers. The European Commission needs to set out guidelines for industry engagement on possible co-investment models, particularly the process to be followed and the high-level principles on various aspects of implementation, including financing and ownership, pre-commitment conditions, terms for exit and entry, pricing flexibility, services and regulatory backstop. This should form part of the ongoing process by which Member States are setting National Broadband Plans in line with the Digital Agenda targets.¹⁵
2. In each Member State, industry should be encouraged to come forward with coherent proposals on how such risk-sharing, co-investment models could be implemented. The proposals in this report are founded on principles and precedents from other industries and are intended to be a first contribution to this debate. However, there may be alternatives to the specifics of the model envisaged here. It will be important that any alternative features are coherent overall, time-consistent and robust.

¹⁵ Such guidelines would be consistent with the already announced plans for European Commission Guidelines on the use of EU funds and broadband investment. See http://ec.europa.eu/information_society/newsroom/ct/fiche-dae.cfm?action_id=204.

3. Policy-makers should set a deadline for the agreement and adoption of such industry proposals, with a clear indication of the counterfactual should no collaborative proposal be forthcoming in a particular Member State.

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1 Introduction

1.1 The objective

The revised Framework Directive, which was brought into force in May 2011, imposes a new duty on national regulatory authorities (NRAs) to:

- promote efficient investment and innovation in new and enhanced infrastructures;
- ensure that any access obligation takes appropriate account of the risk incurred by the investing undertakings;
- permit various cooperative arrangements between investors and parties seeking access to diversify the risk of investment, while ensuring that competition in the market and the principle of non-discrimination are preserved.¹⁶

Unlike other regulated network industries, such as energy, water and rail, which have long-standing investment objectives placed on their regulators, with corresponding licence obligations on network operators, this is the first time that such an EU-wide investment duty has been imposed upon telecoms regulators. This is significant, given the goal of achieving the substantial investment objectives outlined in the Digital Agenda. The current regime has not, thus far, delivered such investments.

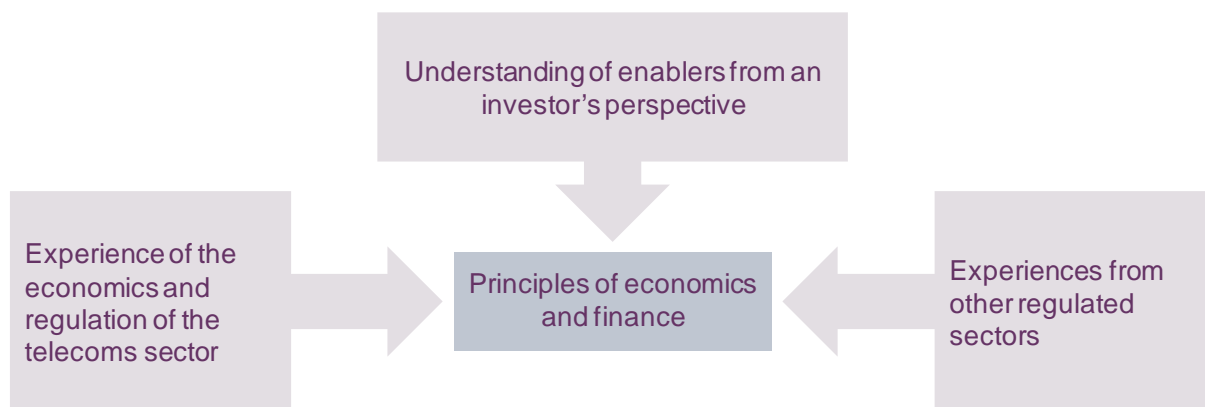
Vodafone commissioned Oxera to examine how this new duty could be applied in practice to the task of next-generation access (NGA) investment. In particular, by building on:

- *principles of economics and finance;*
- lessons from the experiences in *other industries* where large-scale investments have been undertaken and are expected to be undertaken over long periods of time;
- an understanding of the *telecoms industry* and the current challenges it faces across many jurisdictions;
- practical considerations from an *investor's perspective* of what are the enablers that would incentivise infrastructure investment.

This study aims to present a coherent proposal of how 'co-operative arrangements' could address the 'investment gap' identified by the European Commission in NGA networks while meeting the criteria in the revised Framework Directive set out above. Figure 1.1 below illustrates this approach.

¹⁶ Article 8(5)(d) of the Framework Directive states that NRAs shall 'promote efficient investment and innovation in new and enhanced infrastructures, including by ensuring that any access obligation takes appropriate account of the risk incurred by the investing undertakings and by permitting various cooperative arrangements between investors and parties seeking access to diversify the risk of investment, whilst ensuring that competition in the market and the principle of non discrimination are preserved.'

Figure 1.1 Building blocks of Oxera's analysis



Source: Oxera.

1.2 Regulating investments

Broadly, there are three models for regulating industry investment. Regulators can:

- 1) allow the market players to make decisions about investment and technology migration, while the regulator confines itself to intervening (if necessary) to ensure effective competition over the infrastructure after that investment has taken place. This has been the European telecoms regulators' approach to date;
- 2) take a more interventionist role, determining regulated prices that generate a 'fair' rate of return on an approved level of capital expenditure (CAPEX). This approach, used by regulators in regulated utility sectors in many countries, is suitable for sectors where demand risk is relatively low, and where customers exhibit relatively low responsiveness to changes in prices or income as in essential services, such as water and energy;
- 3) adopt a process in which the industry and the regulator agree the long-term investment objectives for the sector, with the regulator providing long-term regulatory certainty over the treatment of investments made in line with that process and objective. This has been the approach of a number of regulators in the aviation and rail sectors.

If telecoms regulators continue to apply the first approach and see their role as solely or principally regulating market outcomes as they occur, it seems unlikely that the fibre underinvestment problem will be addressed. A gradual and uncoordinated shift from copper to fibre networks will take place in Europe, but in light of current market evidence, it seems unlikely to even meet the European Commission's Digital Agenda targets for NGA coverage by 2020.

The second approach requires NRAs to take very detailed decisions about the optimum level, timing and technology for industry investment. This is in itself a challenging task in the relatively stable regulated network utility sectors, and has not been considered appropriate in a technologically dynamic market like telecoms. Given the inherent uncertainty surrounding the progress of telecoms network technologies, it seems unlikely that regulators would be willing to take the responsibility for deciding on the specific forms and levels of investment, while also guaranteeing that those investments will earn a fair return on, and of, capital.

This report focuses on the third option which, notwithstanding the new duty that has been imposed on regulators, would represent a further significant, but achievable, change to NRAs' role in setting and committing to a more coherent framework for fibre investment in Europe. Based on an assessment of the economic case for co-investment using the approach above, this report sets out some robust principles for the practical implementation of the model—referred to as 'NetCo'.

1.3 The context

The 'Digital Agenda for Europe' specifies a target for Internet coverage of 30Mbps or above for all EU citizens by 2020, with half of EU households subscribing to connections of 100Mbps or faster. Networks capable of delivering this service level are commonly referred to as next-generation access or next-generation networks (NGAs or NGNs).¹⁷ Achieving this target via upgrades to the fixed-telecoms network will require large-scale CAPEX, estimated at up to €268 billion.¹⁸

The telecoms industry faces a significant challenge to secure the NGA investment necessary to achieve the Digital Agenda. As Neelie Kroes, European Commission Vice-President, has acknowledged:

Given the current broadband roll-out trends, investment efforts need to be stepped up to achieve the Digital Agenda's broadband targets. The level of roll-out of high-speed networks (also known as 'next generation access' or NGA networks) is very diverse across Europe and take-up levels are disappointing. Investors are not always willing to commit the funds required to carry out a massive NGA roll-out. This trend has to be addressed in the long-term interest of consumers and competitiveness.¹⁹

There are several market features described in this report that might be hindering investment. In particular, the considerable uncertainty about customer demand for NGAs implies that the required levels of return might make network investment projects unviable. This concern is of particular relevance if the underlying regulatory framework does not allow sufficient risk-reflective returns to be generated or does not provide sufficient commitment and consistency over time.

It is recognised that economic viability of NGA investments is not solely dependent on regulatory framework or competitive landscape. Indeed, as discussed below, there is an inherent uncertainty on the aggregate demand—ie, whether customers' willingness to pay is indeed sufficient to exceed the incremental cost of the new services. It is not in the remit of this study to assess the business case for NGA investments, and the consequent benefits for the wider EU economy. Rather, the analysis presented below assesses the economic rationale for, and the implementation of, an industry model in terms of its ability to achieve greater private investment in fibre infrastructure relative to status quo.

1.4 Current status of fibre roll-out in the EU

To date, EU investment in super-fast fibre networks is low relative to the Digital Agenda targets. Under 30% of EU homes today have access to a >30 MB/s connection and only 5% of actual connections deliver >30 MB/s.²⁰ Despite being the enabler for many of the other Digital Agenda goals, the construction and take-up of super-fast broadband is the furthest behind of all the European Commission's Digital Agenda goals, and it shows no, or very limited, improvement over the last year (see Figure 1.2 below).

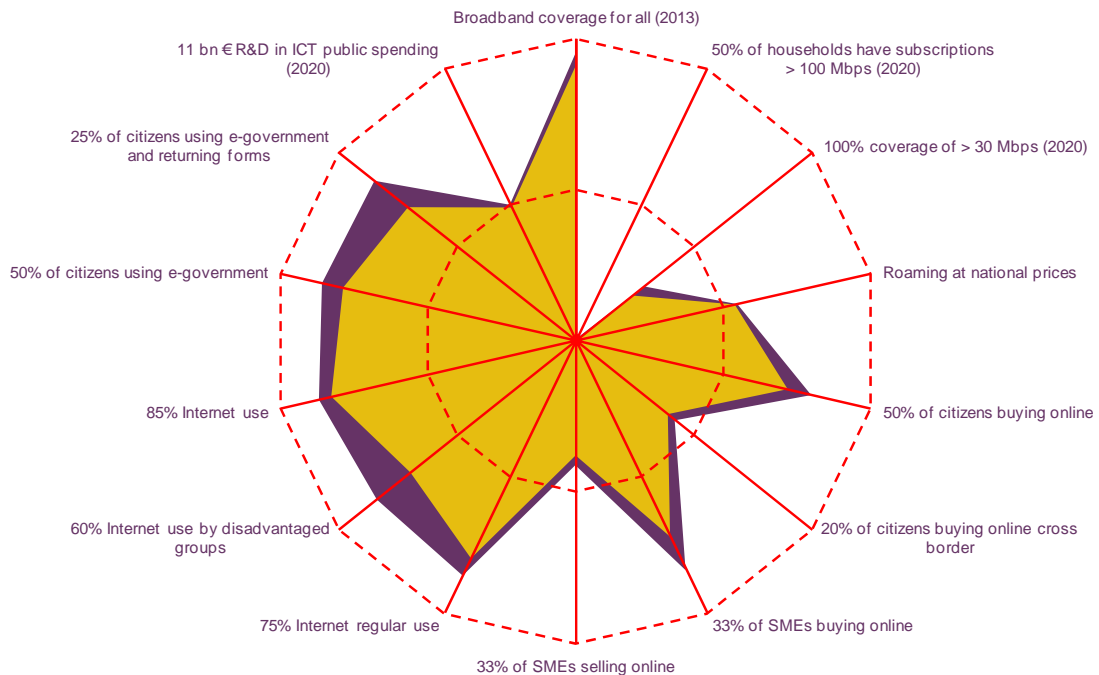
¹⁷ See http://ec.europa.eu/information_society/digital-agenda/index_en.htm.

¹⁸ European Commission (2010), 'European Broadband: investing in digitally driven growth – Communication from the Commission to the European Parliament, the council, the European Economic and Social Committee and the Committee of the Regions', September 20th.

¹⁹ European Commission (2011), 'Digital Agenda: second CEO Roundtable on broadband investment to sustain internet growth', MEMO/11/508, July.

²⁰ Digital Agenda Scoreboard, EC Staff Working Paper 31.05.11.

Figure 1.2 The European Commission’s illustration of the extent to which Digital Agenda targets are being achieved



Note: Yellow shading represents 2010; purple shading represents 2011. Labels refer to targets; outer line is 100% achievement; targets refer to 2015 unless otherwise stated; 20% reduction in energy use not included. Source: European Commission (2011), 'Commission staff Working Paper', Digital Agenda Scoreboard, May 31st.

Table 1.1 provides an overview of the current and planned NGA investments of selected European incumbents in terms of timescales, coverage and technology. It is clear that the current regulatory framework and commercial environment have not delivered the levels of investment required to achieve the Digital Agenda targets.

Table 1.1 Overview of the stated investment plans of selected European incumbents

| Country | Operator | Type | Speed (Mbps) | Number/proportion of homes passed and date |
|---------|-------------------|--------------------------|--------------|--|
| France | France Telecom | FTTB, FTTH GPON | Unknown | 40% of households by 2015, 54.76% by 2020 |
| | Free | FTTH PtP | Unknown | 15% of households by end 2012 |
| | SFR | FTTH PtP and GPON | Unknown | 18% of households by end 2012 |
| Germany | Deutsche Telekom | FTTH GPON | Unknown | 10% of households passed by 2012 |
| | Deutsche Telekom | FTTC VDSL | Unknown | 30% households by end 2012 |
| | Kabel Deutschland | Cable | Unknown | 25% households by end 2012 |
| Italy | Telecom Italia | FTTH GPON and FTTC GPON | 100 | 50% of households by 2018 |
| UK | BT | FTTC (75%) FTTH (25%) | 40–100 | 40% of households by 2012 66% by 2015 |
| | Virgin Media | Hybrid cable | 100 | Mid-2012 upgrade existing coverage (46% of households) |
| Spain | Telefónica | FTTH (GPON) and VDSL | Unknown | 19% households by end 2013 |

| Country | Operator | Type | Speed (Mbps) | Number/proportion of homes passed and date |
|-------------|------------------|-----------|--------------|--|
| Netherlands | KPN/Reggefiber | FTTH PtP | 100 | 1.1–1.3m households passed by 2012 |
| Denmark | TDC | VDSL | 50–70 | 30% of households by 2015 |
| | TDC | Cable | 50–100 | Additional 100,000 households by 2020 |
| Hungary | Magyar Telekom | FTTH GPON | Unknown | 780,000 households passed by 2013 |
| | Magyar Telekom | Cable | Unknown | 380,000 households passed by 2013 |
| Belgium | Belgacom | FTTC | Unknown | 85% of households passed by 2013 |
| Portugal | Portugal Telecom | FTTH GPON | Unknown | 41% Households by end 2011 |

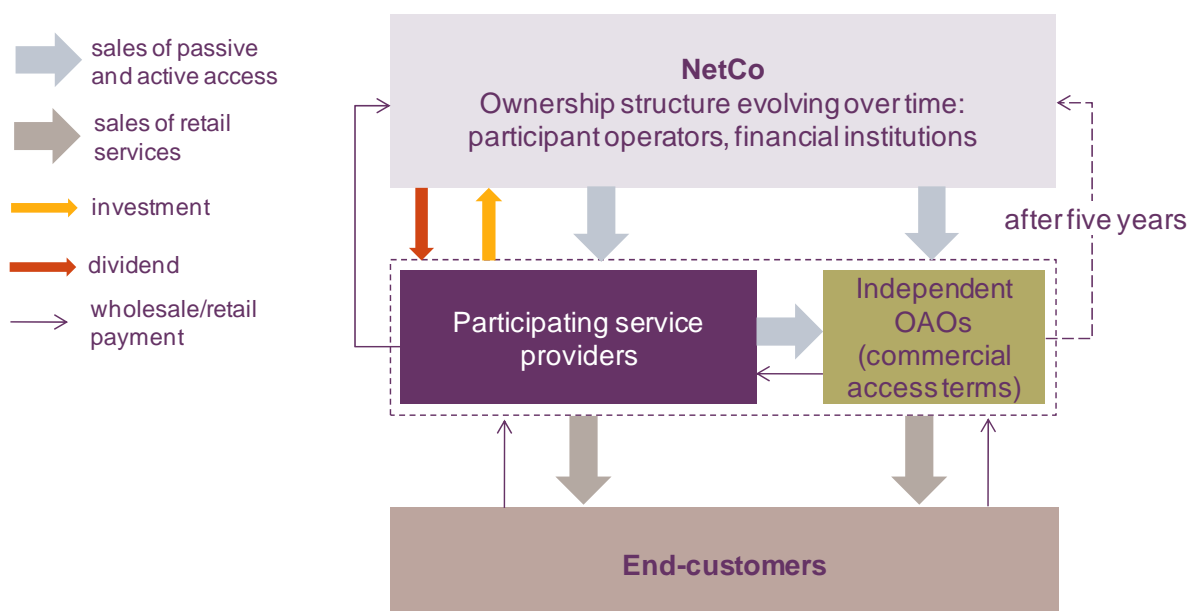
Note: FTTB, fibre-to-the-building; FTTC, fibre-to-the-cabinet; GPON, gigabit passive optical network; PtP, point-to-point; VDSL, very high speed digital subscriber line.

Source: BT (2008), 'BT plans UK's largest ever investment in Super-Fast Broadband', press release, July 15th. BT (2011), 'Openreach to transform broadband speeds', press release, October 5th. BEREC (2011), 'Next Generation Access – Collection of factual information and new issues of NGA roll-out', Board of Regulators Document, February. Cullen International (2011), 'NGA Deployment Plans', August.

1.5 The NetCo model

As described in detail in this study, NetCo would be a structurally separate network entity owned by its participant operators (service providers) (see Figure 1.3), including independent access seekers ('unbundlers') as well as the incumbent. Other independent operators could also enter the market on commercial terms. The ownership structure of NetCo would evolve over time, with external investors (including pension and infrastructure funds) becoming more significant investors once the demand and construction risk reduce. Figure 1.3 gives a high-level overview of the NetCo model in the fixed-line telecoms value chain.

Figure 1.3 Stylised illustration of the NetCo model



Source: Oxera.

NetCo would own and operate the fibre-access assets and provide predominantly passive 'dark fibre' access to its participants and, later, to other alternative operators (OAOs). Hence,

it would control the fibre network elements, but would leave the investment in active electronics and innovation in content and applications layers to the service providers. Participants—ie, NetCo's owners—are envisaged to provide wholesale active access to OAOs on commercial terms.²¹ NetCo would be expected to address the market features that currently hinder investment in fibre-access network by:

- reducing the prospect of duplication of networks, and hence the firm-level demand risk faced by investing operators;
- achieving long-term commitment from all stakeholders, including the regulator, which would be more likely to make such commitments where there is an industry structure with several downstream operators;
- achieving greater alignment of incentives and coordination among market participants in order to maximise network coverage.

These mechanisms are described in further detail below.

1.6 The regulatory dilemma

Investors are particularly sensitive to regulatory uncertainty. For the owners of the existing copper networks, the incentive to invest in deploying the next generation of fibre-optic networks is inherently linked to whether there is a regulatory framework that allows an appropriate return of, and on, the investment. There needs to be sufficient clarity over the lifetime of the investment. In deciding whether to undertake such an investment, the providers of upfront capital will be judging the likelihood of being able to recover their capital, and being appropriately remunerated for the risks they will be taking at the time the capital is committed. Any lack of clarity and certainty on the regulatory commitment will increase the risks of investments, and might mean that they are not economically justified. If the investment is not undertaken, the current owners of the network risk forgoing revenues associated with enhanced services, which in turn are expected to contribute to the health of the overall economy.

In general, telecoms regulators have considered and rejected 'regulatory holidays'—ie, relaxing access remedies from the vertically integrated operator. Examples include the decision by the European Court of Justice to overrule Bundesnetzagentur's (BNetzA) decision to remove access obligations from Deutsche Telekom with respect to NGAs, and the rejection of similar plans by the New Zealand government.²²

For the regulators, the dilemma is just as acute. On the one hand, regulators would probably recognise that regulatory commitment is needed to incentivise the investment in deploying the next-generation network; on the other, current regulators are not well placed to pre-commit their successors to a certain rule set. As made clear in a recent Beesley Lecture:

During periods of high capital expenditure requirements, regulators seek to promote investment by offering high rates of return. However, once the capital is sunk then there are strong political forces encouraging regulators to claw back as much as possible by offering lower rates of return. Even if they feel compelled to follow rules that prevent that from happening, they cannot bind their successors and there is therefore no way in which the regulatory system can provide long-term commitments to firms about allowed rates of return.²³

²¹ The possibility that one or more of the participants possesses SMP in the provision of bitstream or virtual unbundling, or any other wholesale product that uses NetCo's services as inputs, is not excluded.

²² Federal Network Agency (2008), 'Cologne court confirms the Federal Networks Agency's VDSL decision in summary proceedings', press release, January. <http://www.telecomasia.net/content/nz-govt-backs-down-ufb-regulatory-holiday>.

²³ Mayer, C. (2009), 'Financial Markets and Financeability: The Implications of Recent Developments for Utility Regulation', October.

While the periodic nature of ex ante regulation is inherent in the current EU framework, if NRAs can obtain greater confidence in the resulting market structure and self-regulatory mechanisms, they should be able to give clearer long-term assurances to investors.

1.7 Finding the framework to support investment in NGA networks

As discussed above, policy-makers are faced with the question of whether the current framework, with its focus on the ex post regulation of market outcomes rather than investment, is appropriate to achieve the Digital Agenda targets, or whether an alternative regime should (or could) be introduced in the sector. While the regulatory framework does stipulate that innovation and investment should be promoted, it does not specify the means by which the objective would be delivered (this is discussed below).

The range of policy options has, at one extreme, an ex post model based on competition law and, at the other, the regulator pre-determining the 'right' level of CAPEX and guaranteeing that regulated companies will recover their costs and earn a sufficient rate of return. A number of features of the NGA market suggest that neither of the two extremes would be suitable.

- **Demand uncertainty**—as future demand at the industry and firm level cannot be forecast with certainty, investors could require projected average levels of return that might render network investments unviable. Demand uncertainty is present in a number of markets, but is particularly problematic when the upfront investment is substantial and sunk, and the sector is subject to regulatory scrutiny. In this respect, a distinction should be made between the risks associated with aggregate demand—ie, the uncertainty around whether the incremental value to customers of super-fast broadband will be greater than the incremental cost—and the demand uncertainty faced by individual operators.
- **Regulatory uncertainty**—the regulatory framework might change going forward. As a result, investors are reluctant to invest today for fear that, in an upside case (high returns might be clawed back by new regulation (while in a downside case, there would be no off-setting compensation from regulators).
- **Cost characteristics**—NGA networks investment is largely fixed and sunk (and unprecedented). This discourages investment by both incumbents (which fear that their assets could become stranded and their construction costs could run out of control) and entrants (which, in addition to the stranding and cost control issues, fear that they will never acquire sufficient scale to provide services more cheaply than the incumbent should their fibre investment be duplicated).
- **External benefits**—some of the benefits of fibre networks are not appropriated by investors (ie, cannot be charged for). As a result, investment projects that might be beneficial from the social perspective might not be undertaken because the private returns are not high enough to cover the costs.

The telecoms access networks exhibit characteristics of a natural monopoly, similar to other utility industries. However, even the most non-replicable network elements, such as the 'last mile' fibre networks, face a degree of demand uncertainty and potential competition from alternative technology platforms.²⁴

At one end of the spectrum, the solution to this problem could be a regulator-enforced initiative or even a government-funded solution, such as NBN Co in Australia. This would involve government or regulators determining the appropriate level of investment and

²⁴ For example, bi-directional cable TV networks with DOCSIS 3.0 upgrades, and mobile broadband networks, such as long-term evolution (LTE) networks.

ensuring that the providers of capital to fund such investment earn an appropriate rate of return of, and on, investment. At the other end, the companies would be allowed to act freely, constrained only by the forces of the market, in return for shouldering the investment risk with no supporting commitment from the state.

Take first the regulator-enforced model. The significant investment challenge is a well-understood feature of many regulated industries, such as energy, rail and water networks. Health, safety, security of supply, maintaining and enhancing existing networks are all at the centre of massive investments that network industries have had to undertake. In such industries, the regulator's duties traditionally include a duty to ensure that network operators undertake necessary investment in network assets (the 'duty to invest') and a duty to ensure that efficient network providers can finance their functions (the 'duty to finance'). Such a framework has delivered significant investment in the traditional core network industries, and will likely remain in place for as long as significant waves of investment are required to maintain and upgrade networks.

However, the telecoms industry differs from the traditional network utilities, for the following reasons.

- The regulators of the telecoms sector in the EU do not have clear powers to implement such duties. While the Framework Directive (Article 8(5)) stipulates that NRAs have a duty to 'promote investment and innovation in new and enhanced infrastructures'²⁵, how such a duty would be enforced under the current framework has not been articulated. Currently, NRAs cannot force telecoms operators to invest; they can only indirectly incentivise operators through their regulatory treatment of investment or the counterfactual 'no investment' case.
- Even if investment duties were clearly in place, their effectiveness in the NGA market would be questionable. In the presence of demand uncertainty, such a regulatory solution may not produce the long-term certainty and clarity that providers of capital would require. In other regulated natural monopoly sectors, demand is relatively stable (energy, water) or capacity-constrained (airports, rail). In these situations, there is little concern about the willingness to pay being sufficient to cover the investment needs. However, the demand and willingness to pay for 'bandwidth-hungry' services is currently much more uncertain.

In the absence of sufficient demand for bandwidth-hungry services, it is not clear how regulators could ensure that the initial investment would be able to earn the required rate of return—ie, whether they can discharge their financing duty. For example, suppose that the current owners of the copper networks deploy fibre networks themselves. In the case of duplication of network by new entrants, this could render the initial investment by the incumbent uneconomical, and the regulatory contract would not be able to ensure recovery of the initial investment by the incumbent.

- Even if those duties were in place and provided long-term clarity, the lessons from other regulated sectors is that, in fulfilling these duties, regulators generally resort to extensive monitoring of both inputs (capital investment plans) and outputs (levels of service, connection levels). In a sector in which technological changes are more prominent, such monitoring may stifle innovation and have other unintended consequences: while fibre networks are considered as 'passive' parts of the network, access networks in a broader sense are subject to potential innovations.

At the other end of the spectrum, a competition-law-based solution could be implemented, whereby investment is undertaken by a party without the need for regulatory and policy intervention. However, this option is likely to be expensive from a public interest point of

²⁵ Art 8(5) Framework Directive.

view. This is because, if successful, the outcome could be one of monopoly pricing where prices could be set well above the average or variable cost, and higher than is actually necessary to have induced the investment in the first place. It could also be sub-optimal if the entity is unlikely to allow downstream retail competition and there is little interest in innovation once installed. Finally, such a solution would not provide a framework for recognising demand or societal externalities.

Although the current approach to telecoms regulation is somewhere between these two extremes, it has proved ineffective in promoting NGA investment thus far. There is little incentive to move away from the status quo investment patterns because of both demand and regulatory uncertainty. The significant upfront demand (both aggregate and firm-level) and cost risks mean that there is great uncertainty about the rate of return that would be achieved on such a large investment. There is a realistic prospect that the investment will deliver low returns for some time. Furthermore, there is the added risk that, if an investment is particularly successful, there might be regulatory concerns about the potential abuse of monopoly power.

There is limited regulatory guidance on how these assets will be treated in the future and concerns, as expressed above, that any such guidance will never be binding. This presents the real risk that while there remains a substantial downside risk on investment returns, the potential upside should be given lower weight in the investment decision. This is because regulatory intervention will make the potential returns available in the upside scenario less likely, in practice, to be delivered to the investors. This dampens incentives to commit capital to investments that would, on average, be economic.

1.8 A NetCo model that better aligns the incentives for the telecoms industry

In order to develop a possible way forward in relation to the issues presented above, this report draws on an economic analysis of the experiences across countries from both the telecoms industry and other network sectors. The NetCo model described here builds on practical insights from the successes and challenges across a variety of sectors, and proposes a set of practical steps that would help align the incentives of the current owners of the existing networks, regulators and service providers in the industry.

The key features of the NetCo model are summarised as follows.

Feature 1 The creation of a separate legal entity, NetCo, initially owned largely or exclusively by a combination of the current owner of the copper network and various providers. Such a legal entity would operate with an independent Board, which would appoint the chief executive officer (CEO) with a fiduciary duty to all investors, irrespective of their ownership stakes. The entity would be subject to high standards of corporate governance.²⁶

Feature 2 A NetCo Strategic Direction Statement (SDS), setting out the vision for the market over a long-term timeframe (20–30 years). This would provide the NetCo Board's view of what a network access service looks like over a long period of time, and how such a service would satisfy the broad range of potential service provider customers and end-users of high-bandwidth services.

The SDS would be underpinned by a Strategic Business Plan (SBP), which would detail, over a sufficiently long timeframe, the inputs and outputs that NetCo would deliver. These plans, which would ordinarily be common practice in an organisation, would be developed through extensive consultation with all

²⁶ See European Commission (2011), 'The EU corporate governance framework', Green Paper.

stakeholders, irrespective of whether they are owners of NetCo or new entrants in the market.²⁷ This process of engagement is designed to secure the buy-in of the stakeholders (for example, customers, users, investors and regulators) and the legitimacy of what NetCo would be delivering and at what cost.

Across the many sectors covered in this report, there appears to be clear momentum for greater engagement by users in the business planning of the core network, partly to align the incentives of the network providers with the interests of users and, as importantly, to legitimise the outputs of the model, which a purely regulatory-induced approach would lack.

Feature 3 A Next Generation Industry Code of Conduct (NGICC) would form the basis for the technical features of the network, supervised by an external party. The NGICC would set the conditions under which NetCo interacts with its customers and the principles which would form the basis for access terms for participating service providers and third-party entrants.

The NGICC would operate ex post, or in a subordinate way to the high-level regulatory framework. Its main roles would be, first, to ensure compliance with the SBP and its associated investment plan and service-level agreement (SLA); and, second, to provide a platform to process any potential deviations from the SBP. As described in further detail below, the NGICC would determine the circumstances under which any disagreements between participants (or external parties) would be dealt with by an independent arbitrator.

Feature 4 A well-understood regulatory backstop would provide sufficient protection for smaller participants. This would consist of a set of principles which, if not met, could lead to intervention by regulators under their current powers. The regulators' role would focus on ex post monitoring of the arrangement.

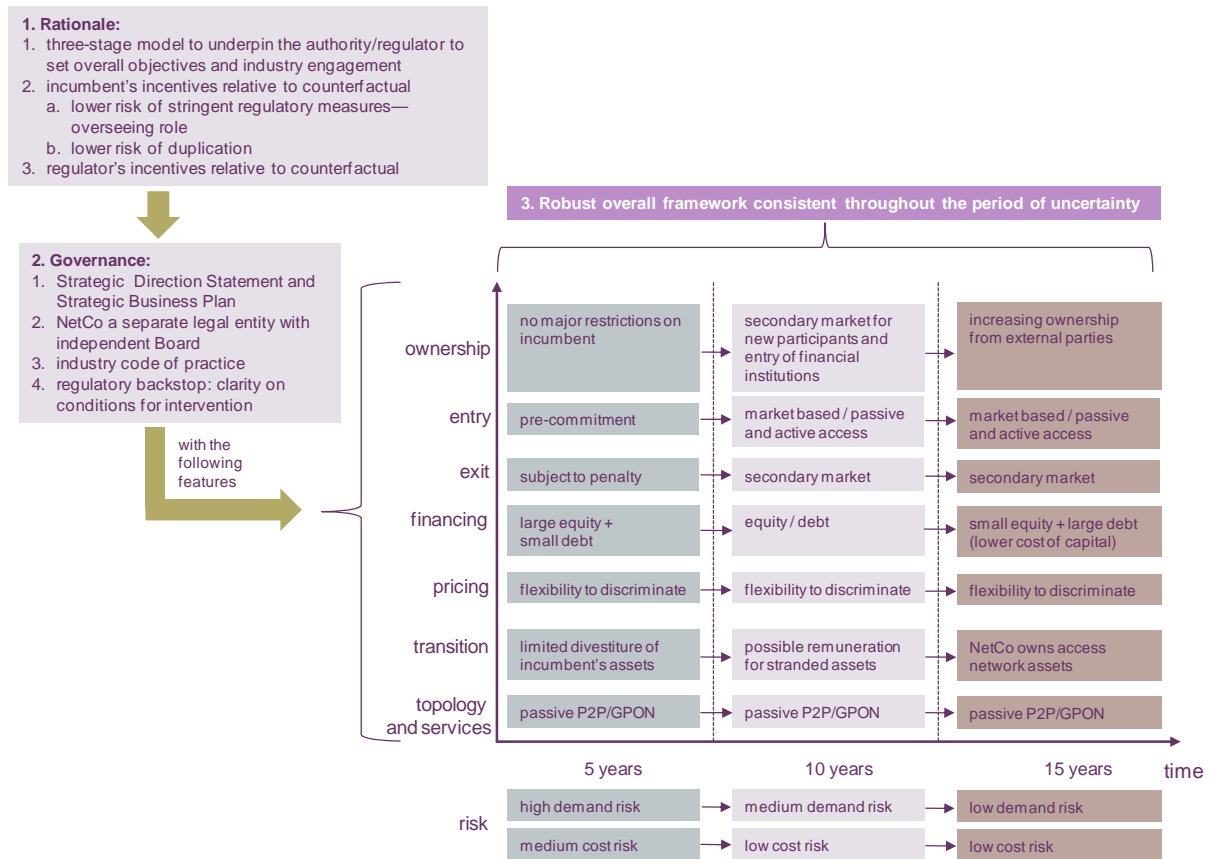
The combination of these high-level features not only draws on practical experiences from other sectors, but is also designed to deliver alignment of incentives across the value chain and the legitimacy of the NetCo framework. At the same time, regulators would be able to use their current powers to exercise oversight and intervene according to predetermined principles.

1.9 Overall framework

The NetCo model presented here, and elaborated on in subsequent sections, is designed to achieve regulatory time-consistency and to be robust over different phases of network roll-out, and over the evolution of demand conditions. The overall framework, which underlies the design of the specific attributes of the model, is provided in Figure 1.4 below.

²⁷ By 'entrants' Oxera refers to alternative operators (access seekers); entrants can be both NetCo participants and service providers which are not owners of NetCo (referred to as 'third-party' entrants).

Figure 1.4 Overall framework



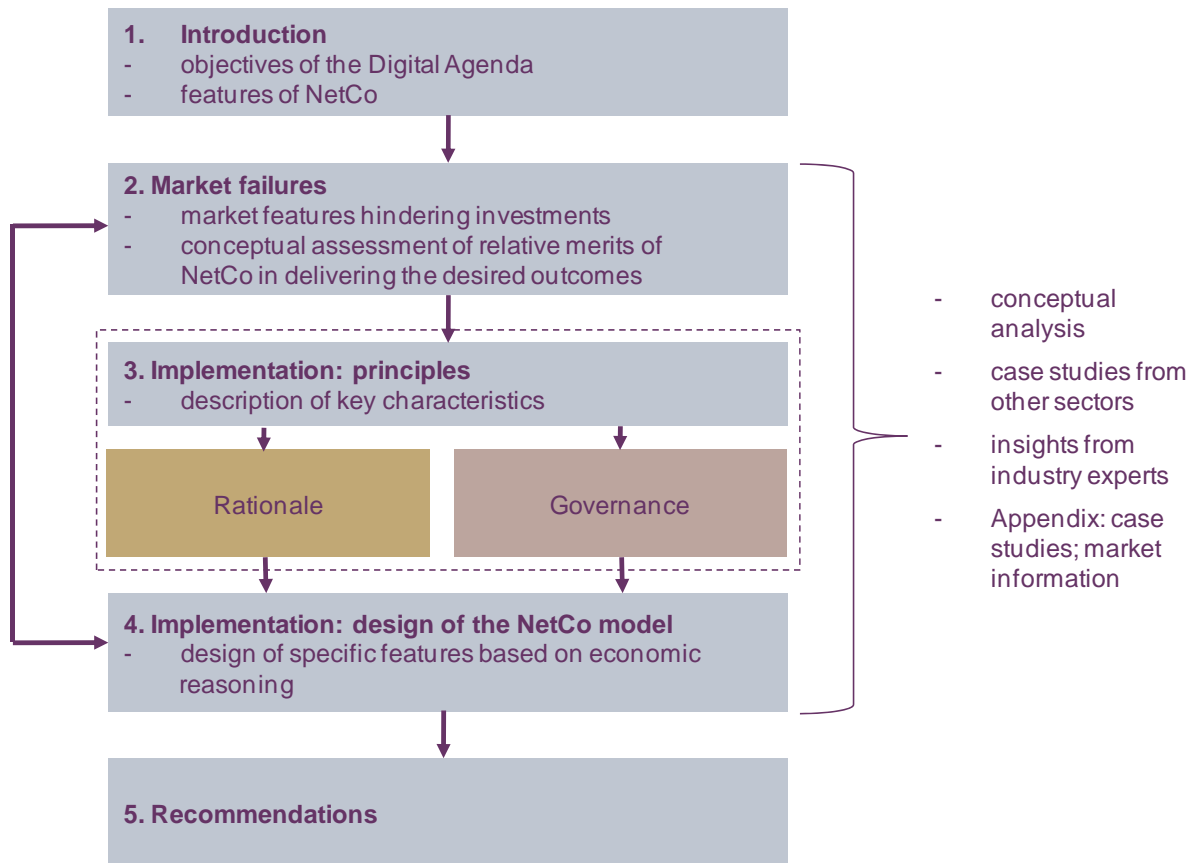
Source: Oxera.

The model is designed against a background of three broad elements, as follows.

- **The rationale**—this builds on the analysis of the market features that currently hinder fibre investment (see section 2), and aims to articulate the incentives of various stakeholders to engage in the process in order to achieve the investment objectives set out by the European Commission through industry collaboration.
- **Alignment of incentives between stakeholders**—central to the NetCo model, this is achieved through a governance structure comprising the four main features presented above.
- **Practical implementation**—the third main element of the model design is to define and articulate the specific approach to various aspects, including ownership, financing, entry and exit, pricing, migration from legacy environment, network topology, and the services provided by NetCo. The design of these aspects recognises the dependencies between them, as well as the evolution over time of the supply and demand characteristics (risk profile, entry and exit) of the market.

The structure of this study is illustrated in Figure 1.5 below.

Figure 1.5 Report structure



Source: Oxera.

- Section 2 explains the market features that are hindering large-scale investment in fibre networks and the mechanisms through which NetCo could address them.
- Section 3 presents the principles and governance structure underlying the implementation of the NetCo model.
- Section 4 provides further detail on the implementation of the model, together with the design of some of its specific aspects.
- Section 5 concludes by providing concrete recommendations for next steps.

2 How would the NetCo model deal with the market features that are hindering investment?

2.1 Introduction

Before describing the characteristics of the NetCo model set out in this report, it is important to provide a review of the economic features of the markets for NGA networks. In the absence of intervention by policy-makers, these features are likely to be hindering large-scale investment today.

Table 2.1 provides a high-level summary of the mechanisms through which the NetCo model would address the market features hindering investment.

Table 2.1 Summary of mechanisms through which NetCo would be likely to address the market features hindering investment

| Market feature | Likely implications NetCo model |
|--------------------------------------|---|
| Demand uncertainty—aggregate demand | <p>NetCo model would not have an impact on consumers' willingness to pay for fibre-access services</p> <p>Would provide pricing flexibility to meet demand and willingness to pay and, insofar as total costs are lower, this would enable lower pricing and greater output</p> <p>Virtuous circle: large-scale network roll-out enabled by the NetCo model would support development of content, which would drive end-user demand</p> |
| Demand uncertainty—firm-level demand | <p>Would remove the risk of duplicate investments by co-investing parties</p> |
| Regulatory uncertainty | <p>Given the ownership structure (NetCo's owners would constrain it from charging excessive prices) and the reduction of incentives to discriminate between participants, the NetCo model would provide reassurance for the regulator to pre-commit for a longer period of time</p> <p>Could remove the need for certain behavioural remedies and increase transparency</p> |
| Cost characteristics | <p>Lower operational gearing (less duplication of networks) at the industry level</p> <p>Could be designed/coordinated so that the timing of network deployment and price path are in line with the process of phasing out copper and current DSL electronics</p> |
| External benefits | <p>Commitment from co-investors to only one large network would resolve the problem that each co-investor would attempt to invest only in the more profitable urban areas, leaving the less profitable areas uncovered</p> |
| Overall effect | If appropriately implemented, the NetCo model could provide a basis for more NGA investment |

Source: Oxera.

2.2 Market features hindering large-scale NGA investment

As described above, a number of market features are believed to be hindering large-scale investment in next-generation broadband infrastructure across the EU. This section describes each of these market features and discusses how the NetCo model would deal with them. The high-level features of the model are summarised in Box 2.1, and are described in more detail in sections 3 and 4.

Box 2.1 High-level overview of the NetCo model

- **Stakeholder commitment.** All key stakeholders, including the regulator, the incumbent and the participating entrants, would commit to the pre-defined objectives and business plan, governance structure and regulatory framework. Long-term commitment is essential to ensure a coordinated migration to NGA, steady cash flows to fund NetCo's CAPEX and operating expenditure (OPEX), as well as long-term regulatory certainty.
- **Separate legal entity with an independent board.** NetCo would be a jointly owned network operator providing fibre access to its investors. The initial NetCo investors would be expected to be service providers in the downstream market (including the incumbent). Once the majority of network is built, and the construction risk is over, financial institutions would be expected to enter and invest in NetCo, which would operate as a separate commercial entity. Co-investors that currently use alternative fixed access networks would commit to migrating all their customers to the NetCo network, and not to invest in alternative fixed access networks that could compete with the NetCo network, for a pre-specified period of time.
- **Legitimacy and clear governance structure.** The rules for NetCo's governance (introduced in section 1 and further described in section 3) would be set so as to balance the co-investors' interests, including decisions on CAPEX, network maintenance or upgrades, future network build and long-term pricing structure. Principles to deal with the core elements of the regulatory regime, such as access regulation, would be defined from the outset of the NetCo project, with a regulatory commitment not to change them ex post.
- **Unreplicable assets and accessible network.** NetCo's assets would be predominantly passive fibre-access inputs ('dark fibre') and it would lease the underlying infrastructure (ducts, cabinets, buildings) from its current owner (in most cases, this would be the incumbent). Over time NetCo would gradually purchase other passive infrastructure from the incumbent. Each service provider would be responsible for its own 'active' communications equipment (electronics) and the retail services it chooses to provide. While, where economically feasible, NetCo would deploy a point-to-point network; where alternative topologies already exist, or are otherwise preferable, NetCo would provide active access.
- **Flexible pricing.** NetCo would set its prices such that the returns of NetCo as a collective entity are maximised and would be allowed to price-discriminate in an efficient manner—subject to the 'safety cap' introduced to avoid excessive pricing. Co-investors that are also service providers would be entitled (via long-term supply agreements) to purchase loops or access, which in the future might be sold in a secondary market. This mechanism also provides an access route to the market for later co-investors. Alternatively, independent entrants (OAOs) could provide retail services by purchasing active (bitstream, virtual unbundling) access from the participants or, after five years, potentially directly from NetCo. NetCo would sell access to its participants on pre-determined wholesale prices. NetCo's pricing, described in further detail in section 4, would be designed to generate returns commensurate with the risk at the time of investment.

2.2.1 Demand uncertainty

Significant uncertainty of demand is a key risk of NGA network investments. In contrast to the copper-access networks that have been used in the provision of 'tried and tested' products (eg, fixed telephony, ADSL), the revenues generated with FTTx networks are dependent on customer willingness to pay for capacity that enables them to receive bandwidth-hungry content. Indeed, demand uncertainty was flagged as an important barrier in the recent European Commission CEO Roundtable on broadband investment to sustain Internet growth:

A significant barrier to NGA roll-out is that demand for ultra-high speed services and applications and the migration of customers towards NGA networks is uncertain, at least in the short term. The future relationship between copper and NGA and between fixed and wireless networks is hard to predict with certainty. This increases the level of risk and puts into question the return on investments. This uncertainty has to be addressed in order to reassure investors.²⁸

Demand uncertainty occurs at two different levels of demand, as follows.

- **Aggregate or total demand uncertainty ('market size')** arises mainly because high-speed broadband may not be perceived as a necessity, and hence total demand for this service could be relatively responsive to fluctuations in income levels (in economic terms 'income elasticity') and changes in price ('price elasticity'). This characteristic of demand could lead to potential customers remaining satisfied with lower-speed broadband services, such as those provided today over the existing copper network, instead of high-speed broadband. This could in turn lead to the customer base of high-speed broadband not being large enough to allow the investing company to recover the economic costs of the investment project.
- **Firm-level or residual²⁹ demand uncertainty ('market share')** arises mainly because each operator investing in high-speed broadband networks independently faces the risk that the particular technology adopted could be superseded by alternative platforms (using either the same or different technologies) during the lifetime of the assets. As a result, each independent investor's residual demand has the potential to drop significantly.

It is worth noting that demand uncertainty faced by the network operator could be reduced if customer commitment on future purchases were increased, for example, by committing to long-term service agreements. Under the present industry model of regulation of vertically integrated incumbents, wholesale customers (ie, service providers leasing the incumbent's network facilities) do not normally engage in long-term agreements. Typically, the contracts involve a one-off connection fee and a monthly charge. The implication is that service providers could quickly reduce their use of the incumbent's services in response to an alternative offer, an economic downturn, or some other demand shock.

These demand uncertainty factors, combined with the sunk nature of the costs (discussed below), translate directly into significant uncertainty on the returns that, even in the absence of regulatory intervention, it would be possible to earn on the investment projects. This is ultimately the key variable that investors will consider when deciding whether to invest in fibre networks. As the European Commission notes:

Unfortunately many potential investors in fibre-based high speed broadband networks are put-off by the very long payback period and uncertainties on the rates of return.³⁰

How NetCo would address the demand uncertainty problem

There are two fundamental commitments that a co-investor could make to the NetCo model that would reduce demand uncertainty, as follows.

- **Commit to decommissioning (or integrating, if feasible) existing networks in exchange for compensation:** this relates in particular to existing copper networks, which would be decommissioned under the NetCo model. This removes the risk that

²⁸ European Commission (2011), 'Digital Agenda: second CEO Roundtable on broadband investment to sustain internet growth', MEMO/11/508, July.

²⁹ The aggregate demand minus the supply of the competitors.

³⁰ European Commission (2010), 'Digital Agenda: Commission measures to deliver fast and ultra-fast broadband in Europe – what would they do for me?', MEMO/10/426, September. European Commission (2011), 'Questionnaire for the public consultation on costing methodologies for key wholesale access prices in electronic communications', October 3rd.

retail customers could choose to maintain lower-quality services on a remaining, independent, copper platform, and thus the risk that competition between the (old) copper and the (new) fibre will bid the price down to marginal costs. NetCo would also seek to incorporate and provide compensation for the fibre networks already built by its participant operators.³¹

- **Commit to not investing in alternative fixed access networks while they are NetCo investors:** this relates to the threat that investors could otherwise reduce their reliance on NetCo by ‘cherry-picking’ and self-building in those dense areas with lower costs than the average NetCo cost, which is spread over a larger footprint. This would also provide reassurance to all parties that the investors are ‘tied in’ as wholesale customers of NetCo for the long term. Investment in other access networks (eg, wireless) would not be subject to this restriction.

These two commitments would ensure that the customer base, across which the large fixed costs of setting up a fibre network could be spread, is as broad and stable as possible throughout the timescale of the investment project. The larger the share of the market participating in the co-investment vehicle—and hence pre-committing to decommissioning existing networks and not investing in alternative fixed access networks—the greater the reduction in demand uncertainty.

Nevertheless, it is worth considering that this benefit would, arguably, need to be balanced against the potentially detrimental implications for dynamic competition. This is because the co-investing companies would stop competing to develop new, alternative fixed network technologies that could replace fibre in the long term. They would, of course, remain free to develop wireless access. That said, as NetCo ensures that a number of competitors would have equivalent access to the passive fibre or ‘dumb pipe’ bitstream, there is far greater scope for competitive innovation and investment beyond such access infrastructure—for example, in the electronics equipment and the applications layer of the network. More robust competition at this layer over a wider network footprint seems likely to bring greater consumer benefits than theoretically desirable infrastructure competition on a smaller, piecemeal geographic scale. This is consistent with competitive dynamics in the current generation broadband markets, where entrants have, in more competitive countries, invested significantly in their own core networks, backhaul connections and electronics (eg, DSLAMS), while investment in lines reaching end-users has been somewhat limited.³² This can also be seen in other network industries, such as energy, competition is encouraged where the benefits are considered to outweigh the costs (the retail and generation levels), but not at the transmission and distribution levels.³³

2.2.2 Regulatory uncertainty

Regulation is another central consideration for NGA investments because it also has a fundamental effect on the returns that investors could, on average, expect to earn. An appropriate regulatory regime needs to be consistent with several key principles, ensuring that:

- economic costs are recovered (where this is possible);

³¹ In principle, this could include cable networks, but the technical difficulties of incorporating cable technology within NetCo is not addressed further in this report.

³² See

http://ec.europa.eu/information_society/policy/ecomm/doc/implementation_enforcement/annualreports/15threport/15report_part1.pdf.

³³ The market liberalisation was introduced by the European Commission through Directive 96/92 for the electricity market, followed by Directive 98/30 for the gas market, with an intention to introduce competition in generation/production and distribution, as well as to vertically separate the different segments in the energy value chain. For a discussion of this, see Cambini, C. and Rondi, L. (2009), ‘Incentive Regulation and Investment: Evidence from European Energy Utilities’, Politecnico di Torino, DISPEA.

- in any future intervention, the allowed return reflects the risks that were present when the investment was *made* (not the future risks when the regulatory intervention takes place);
- the structure of regulation is time-consistent;
- competition is safeguarded.

Of particular importance in supporting NGA investment is the consistency of ex ante and ex post regulation. As the regulatory framework has direct implications for the expected returns, any perceived risk of a revision to the maximum allowed price midway through the economic lifetime of investment will affect the investor's ex ante decision—investors are likely to be more reluctant to invest today if they feel there is a significant chance that, in any upside case, future returns might be clawed back by some new regulation.

The appropriate regulatory framework has been discussed at length and the European Commission has published guidelines for NGA regulation. However, few concrete proposals have been put forward on the underlying regulatory mechanisms that would determine the risk and returns of NGA investment.³⁴ Indeed, while the need to ensure that there are incentives to invest has been debated extensively, as set out in Box 2.2, finding the right balance of providing sufficiently attractive entry signals under the current vertically integrated industry structure continues to remain controversial.

Box 2.2 Examination of the counterfactual: investment incentives under the status quo

The controversy and consequent uncertainty around finding the 'right' form of access regulation is reflected in diverging results of some recent academic and consultancy studies on this subject, as well as in the recent proposals put forward by the European Commission. A summary of key findings and arguments is presented below.

The conventional argument says that access regulation adversely affects the incumbent's future potential cash flows related to the investment by fostering 'too much' competition in the downstream market—in other words, obligations to grant equivalent access to the new network assets eliminate the first mover advantage associated with the investment.¹

The impact of access regulation on *entrants'* investment is more ambiguous. Some empirical studies indicate that entry regulation has discouraged investment by entrants in fixed-line telecoms networks. In particular, had there been no access regulation of incumbents' networks, it is suggested that the stock of telecoms investment in Europe would be 8.4% higher and this would have been fully explained by entrants' investments. The same study finds no relationship between access regulation and the incumbent's investment incentives.²

Additionally, a study commissioned by ETNO, the association of European incumbent network operators, examines the impact of access regulation on the growth rate of 'unbundling-based lines' versus 'facilities-based lines' (eg, cable, fibre-to-the-home, wireless local loop). Regulation was found to negatively affect both incumbents' and entrants' investments.³

The European Commission seems to have recognised the relationship between ex ante regulation and investment incentives. It has, for example, noted that a 'risk-premium' could be considered in determining the regulatory cost of capital (WACC) for the pricing of access to unbundled fibre loop (for the market review period).⁴ At the same time, the Commission has placed a significant emphasis on promoting competition through cost-based access to physical infrastructure, including ducts and fibre loops, and has continued to investigate how the obligations not to price-discriminate could be further reinforced, including the option of functional separation.

Notably, as shown in the consultation launched by the European Commission in October 2011, the current debate culminates on the question of whether a substantial reduction of copper-access prices (implemented through changes in regulatory costing principles) could incentivise fibre roll-out. This proposition builds on the notion that:

³⁴ European Commission (2010), 'Commission Recommendation of 20 September 2010 on regulated access to Next Generation Access Networks (NGA)', September 20th.

investment in fibre could be made unattractive due to supernormal profits on the existing copper network and migration from copper to fibre might not occur at the desired speed. [...] high copper access prices may not permit alternative operators to avail themselves of a sufficient margin to eventually invest in fibre. Consequently, unduly high copper prices may hamper the migration from copper to fibre.⁵

This analysis builds on the work of WIK for ECTA,⁶ an association of competitive telecoms operators (largely access seekers); while counter-arguments have already been put forward by a study commissioned by ETNO—that lower legacy access prices disincentivise wholesale and retail customers from migrating to the now more expensive fibre products.⁷

Notes: ¹ Baake, P., Kamecke, U. and Wey, C. (2007), 'Efficient regulation of Dynamic Telecommunications Markets and new Regulatory Framework in Europe', in *Access Pricing: Theory and Practice*, Elsevier B.V., p. 378. ² Friederiszick, H., Grajek, M. and Röller, L-H. (2007), 'Analysing the relationship between regulation and investment in the telecom sector', ESMT, November. ³ Bijl, P.W.J. and Peitz, M. (2007), 'Innovation, convergence and the role of regulation in the Netherlands and beyond', TILEC Discussion Paper, May, p. 9. ⁴ European Commission (2010), 'Commission Recommendation of 20 September 2010 on regulated access to Next Generation Access Networks (NGA)', September 20th. As far as Oxera is aware, none of the NRAs have, thus far, quantified and implemented such a risk premium. ⁵ European Commission (2011), 'Questionnaire for the public consultation on costing methodologies for key wholesale access prices in electronic communications', October 3rd, p. 9. ⁶ WIK-Consult (2011), 'Wholesale pricing, NGA take-up and competition', April 7th. ⁷ Plum (2011), 'Costing methodology and the transition to next generation access', a report for ETNO, March.

As summarised in Box 2.2, there seems to be a degree of controversy and uncertainty in developing robust access regulation principles that protect and incentive investments and innovation, yet ensure competition.

Regular market reviews every three years are central to the current EU framework, allowing regulators to revisit earlier decisions long before any investment in NGA will have been paid back. While periodic price control reviews are present in other utility sectors, as well as in many EU countries, and claw-back mechanisms are not unprecedented,³⁵ the 'building block' (regulatory asset base, RAB) approach of other regulated sectors places a significant emphasis on ensuring that efficiently incurred costs are recovered. Indeed, while the duration of the construction and demand risk vary by sector, precedents from other sectors with substantial investment in long-lived assets suggest that the periods for which the regulated companies obtain licences are typically a minimum of ten to 25 years, providing sufficient certainty to the parties making the investment.³⁶ In addition, in these industries there is usually very little, if any, risk that it will not be possible for the investors to earn an adequate return on their investments as a result of aggregate demand turning out to be insufficient.

In effect, as noted in section 1, regulators are more involved in CAPEX planning, which in turn feeds into the determination of allowed prices. This provides greater certainty for cost recovery, but is more applicable in sectors where demand is more inelastic than in the telecoms sector, or where capacity constraints are present.

Recognising the uncertainties associated with NGA investments, a number of NRAs have put forward less stringent regulatory approaches for fibre-access products (eg, not imposing cost-based price controls, but relying instead on a non-discrimination obligation).³⁷ These approaches are often stated explicitly to be transitory measures, and might be subject to challenge by the European Commission.³⁸

³⁵ See, for example, Europe Economics (2010), 'Report for the CAA by Europe Economics Regulating Finance for NATS CP3', January 29th.

³⁶ See the examples from rail, aviation, electricity transmission, distribution and supply, as well as gas transport and shipping, as described further in this report.

³⁷ See a summary of regulatory approaches on NGA regulation in the Appendix.

³⁸ For example, the European Commission stressed that Ofcom's proposed pricing flexibility for virtual unbundling should only be accepted as a temporary measure. European Commission (2010), 'Telecoms: Commission accepts UK regulator proposal to mandate virtual unbundling of BT's fibre networks but requests full unbundling as soon as possible', IP/10/654, June 2nd.

Thus, from an investor's point of view, there is still significant uncertainty surrounding the scope and form of regulation over the medium to long term. As a result, potential investors might be reluctant to invest, or would only do so for projected average returns that are so high or front-loaded as to render NGA-type investment projects unviable.

How NetCo would address the regulatory uncertainty problem

A fundamental requirement of the NetCo model is that the principles to deal with core elements of the regulatory regime should be defined *ex ante* and maintained *ex post*. This would require commitment from the regulator that it would not change the rules after the NGA investment is undertaken (and sunk).

To provide reassurance to the regulator, so that it can commit to maintaining the regulatory principles, the NetCo model design ensures that there would be sufficient retail service providers competing in the downstream part of the value chain. This reassurance is important, since one of the reasons why NRAs appear to feel uncomfortable about committing to long-term regulatory regimes—particularly to those that are less interventionist—is the fear of the incumbent monopolising the end-to-end production process to supply retail services (ie, a vertically integrated monopoly). This 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 both the costs and the risk incurred by an investing undertaking, and can thus lead to more extensive deployment of FTTH.³⁹

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 [significant market power] is found.⁴⁰

While the NetCo approach would not envisage duplicate parallel fibre connections (per household), the rationale of ensuring that multiple operators have equivalent access to unbundled fibre lines applies equally here.

In addition, the NetCo model envisages that an industry code of conduct and a set of governance rules (including rules to guarantee retail competition) would be designed, taking into account the concerns of the government and regulators. In effect, through the governance structure that aligns incentives (with a regulatory backstop), there are insiders preserving consumer welfare, rather than the regulator being the sole guardian. The design of the governance structure is presented in section 3. Regulators could also retain the ability to intervene if NetCo were to earn manifestly excessive returns. The thresholds for any such 'safety cap' intervention would need to be defined upfront (and would likely reduce over time).

2.2.3 Cost characteristics

There are three fundamental characteristics of the NGA network costs that might also explain why companies are reluctant to invest, as follows.

³⁹ European Commission (2010), 'Commission Recommendation of 20 September 2010 on regulated access to Next Generation Access Networks (NGA)', September 20th, para 27.

⁴⁰ *Ibid.*, para 28.

- **The costs are fixed**—a significant part of the investment in NGA networks has to be undertaken upfront and to some extent independently from the volume of the output produced by the business. Put another way, the network needs to be built before services can be provided over it; services and content offerings often require a critical mass of customers, and hence the telecoms networks are, to some extent, constructed upfront with an expectation that demand will materialise as services evolve.
- **The costs are sunk**—a significant part of the investment in NGA networks cannot be recovered once undertaken. For example, according to some estimates, civil engineering costs (eg, digging up roads) represent around 60–70% of the total costs of fibre network deployment.
- **The project is unprecedented**—investment in NGA networks exhibits characteristics of ‘greenfield’ investment in the construction of network assets supporting non-essential services/products with no direct comparators.

The fixed nature of the investment implies that there are economies of scale/density. As a result, average costs are likely to be minimised if the outputs are produced by only one supplier (in economic terms, the sector has natural monopoly characteristics), which discourages potential entrants from challenging the incumbent’s market share. In the words of Ofcom and the OECD:

The economies of scale and scope of NGA investments are likely to reduce the degree of replication, potentially leading to an enduring economic bottleneck. The extent of economies of scale mean that in certain locations there may be natural monopoly (or duopoly) features in a NGA network.⁴¹

[...] the scope for multiple investments in duplicate competing next generation access networks in a given region may be limited due to the economics involved. The possibility that next generation access will be comprised of a small number of networks, or perhaps only one, makes the promotion of competition more complex.⁴²

The sunk nature of the investment puts investors in a very fragile position with regard to demand and regulatory uncertainty (both discussed above). They do not have a real option to leave the sector if any of the possible downside scenarios arise after the investment has been undertaken. This is perceived by potential investors as a significant risk of asset stranding, and has the effect of substantially increasing the necessary hurdle rate for expected returns for investing in NGA networks.

It is worth noting here that as the copper network investment is also largely sunk in nature, this further undermines NGA investment incentives. This is because there is a degree of uncertainty on how the copper asset owners will be compensated when the copper networks are decommissioned.

Further, in several countries there is a competing infrastructure in the form of cable which, due to asset write-downs and debt restructurings in the 1990s, also represents a sunk and depreciated asset. In many Member States, cable networks have been upgraded into NGA equivalents (specifically, DOCSIS 3.0), mainly in urban areas. While this underlines the risk of stranding copper assets even in the ‘no NetCo’ scenario, since the PSTN/DSL platform will in any event be superseded by enhanced bi-directional cable TV networks, it also undermines fibre investment as it means that any additional NGA investment is likely to capture only a proportion of total high-speed broadband demand.

Lastly, NGA networks represent an unprecedented greenfield investment project. This implies that there is limited data on similar projects that could be used to inform the

⁴¹ OECD (2011), ‘Next generation access networks and market structure’, June.

⁴² Ofcom (2007), ‘Future broadband. Policy approach to next generation access’, September.

investment appraisal of NGA networks, and limited market testing of such investments. Investors tend to require an additional premium for financing such projects. In other words, the NGA networks represent an investment in the construction phase of the project, while the operation of the existing networks (eg, copper) are currently at the lower-risk operational phase.

How NetCo would address the cost uncertainty problem

In summary, investment in NGA networks is largely fixed, sunk and unprecedented. This discourages investment by both incumbents (which fear that their existing assets could become stranded and their construction costs could run out of control) and entrants (which, in addition to the stranding and cost control issues, fear that they will not be able to achieve sufficient scale to provide services more cheaply than the incumbent if they are overbuilt). These cost characteristics are given and cannot easily be changed—for example, laying fibre cables underground is inherently a sunk cost. However, the NetCo model has been designed to ensure that these characteristics do not deter investment—for example, the NetCo model addresses:

- the fixed-cost problem by establishing an entrants–incumbent partnership which guarantees that all partners will exploit together the scale economies (ie, all partners will build and use only one large and economically efficient fibre network);
- (some of) the sunk-cost problem by reducing (as far as possible) the demand and regulatory uncertainty, thereby minimising the asset-stranding risk;
- the operational inefficiency of running parallel copper and fibre networks for an extended period and dividing total demand between them;
- the unprecedented nature of these costs by enabling a partnership between those with the knowledge and experience to be in the best position to face the risks of this type of greenfield investment.

2.2.4 External benefits

Broadband networks are expected to benefit the wider economy. For example, public administrations wish to increase investment in NGA networks since they are the enabler of increased productivity in the long term, while promoting economic recovery in the short term. As the European Commission notes:

Information and Communications Technologies (ICTs) have driven half of the productivity growth in Europe over the past 15 years [...] However, if Europe wants to fully exploit the potential benefits of the digital economy, it must step up a gear and provide faster broadband and an internet people trust, improve citizens' skills, and encourage even more ICT innovation.⁴³

Nevertheless, some of these benefits (known as external or societal benefits) are not likely to be captured by private investors (ie, there is no mechanism by which companies could charge for them). Thus, while these societal benefits are not an impediment to the investment as such, they will not translate into returns when the private investors run their models to assess the viability of potential investment. As a result, they may rule out projects that are not beneficial from the private point of view but are worth pursuing from the public perspective.

How NetCo would result in greater external benefits

The NetCo model would be designed to deliver a comprehensive NGA network. On the contrary, if there were no commitment from co-investors to only one large network, each co-investor would attempt to invest only in the more profitable urban areas, leaving the less

⁴³ European Commission (2010), IP/10/571, May.

profitable rural areas uncovered. Furthermore, the NetCo model would allow for the possibility of the government becoming one of the investors in the NetCo, enabling new governance channels through which governmental views on socially desirable investment would be brought in front of other NetCo stakeholders.

By creating one large fibre network company, the NetCo model allows for the possibility of de-averaging pricing across the network, which in turn could enable a greater degree of price discrimination and hence greater output (ie, network coverage). Further, where public funding would be warranted, the EU NGA state aid practices would apply. NetCo could participate in the (reverse) auctions to obtain licences to operate passive networks in selected rural areas. It is recognised that the European Commission's guidelines for NGA state aid stipulate that where public funding is injected to finance access networks, the networks should be operated on an open access basis. Insofar as NetCo would control, partly or entirely, state-funded networks, it would be subject to the relevant legislative framework.

To sum up, the NetCo model would address each one of the market features that is considered to be hindering investment, as follows.

- **Demand uncertainty** would be reduced by the commitment from co-investors to decommission (or integrate, if feasible) existing networks and not to invest in alternative fixed access networks. The certainty over network roll-out would be expected to have a positive knock-on effect on retail services, given that investments in content and applications depend on the underlying network.
- **Regulatory uncertainty** would be reduced by providing reassurance to the regulator that its commitment to a long-term regulatory regime would not lead to excessive charges and undue discrimination in the sector.
- **Cost characteristics** would be addressed mainly by enabling an entrants–incumbent partnership that ensures no duplication of passive access network elements.
- **External benefits** would be addressed to the extent that sharing the CAPEX and avoiding duplication allows greater network coverage achieved through private funding (possibly complemented by public subsidies, where considered necessary).

3 Implementation: overarching governance structure of the NetCo model

The conceptual assessment described in section 2 outlined mechanisms through which the NetCo model could result in a beneficial outcome to different stakeholders relative to the counterfactual. The economic case for the model is dependent on the way in which different stakeholders engage in the process of introducing the model, and the specific design of its implementation. There are also apparent differences across countries in terms of, for example, current state of competition, existing fibre footprint and the cost of finance.

The basic counterfactual is a continuation of the status quo which is seen in Europe today:

- relatively limited and defensive incumbent deployment of fibre, largely in response to cable operators' upgrade to DOCSIS 3.0, which is likely to be completed shortly;
- some small-scale (in an EU-wide sense) alternative operator deployment of fibre, particularly where infrastructure access (eg, sewers or low cost duct access) makes roll-out less costly;
- continued application of three-yearly market reviews, significant market power (SMP) analysis and application of remedies in line with the NGA Recommendation.

It is not the primary function of this report to detail the ways in which this central counterfactual could change. However, it is clear that lower regulated copper charges, low-cost duct access, more stringent enforcement of non-discrimination obligations and/or imposition of stricter regulatory remedies including functional separation could each significantly affect the standard against which stakeholders would need to judge the NetCo proposal.

Recognising these factors, this section sets out generic principles and features for the governance structure of the NetCo model. This 'blueprint' is designed in sufficient degree of detail to provide a sound basis for the NetCo to result in an advantageous outcome relative to the counterfactual, yet the specific parameters can be tailored to meet country-specific policy (and commercial) objectives.

As described above, the approach followed has been to draw on lessons from sectors where regulators were, and are, looking to incentivise large-scale investments. Across countries and sectors, there are useful insights, which, when combined with an understanding of the economic characteristics of NGA networks, allow practical and detailed suggestions of features for a model that could deliver the necessary investment in NGA.

3.1 Overall framework

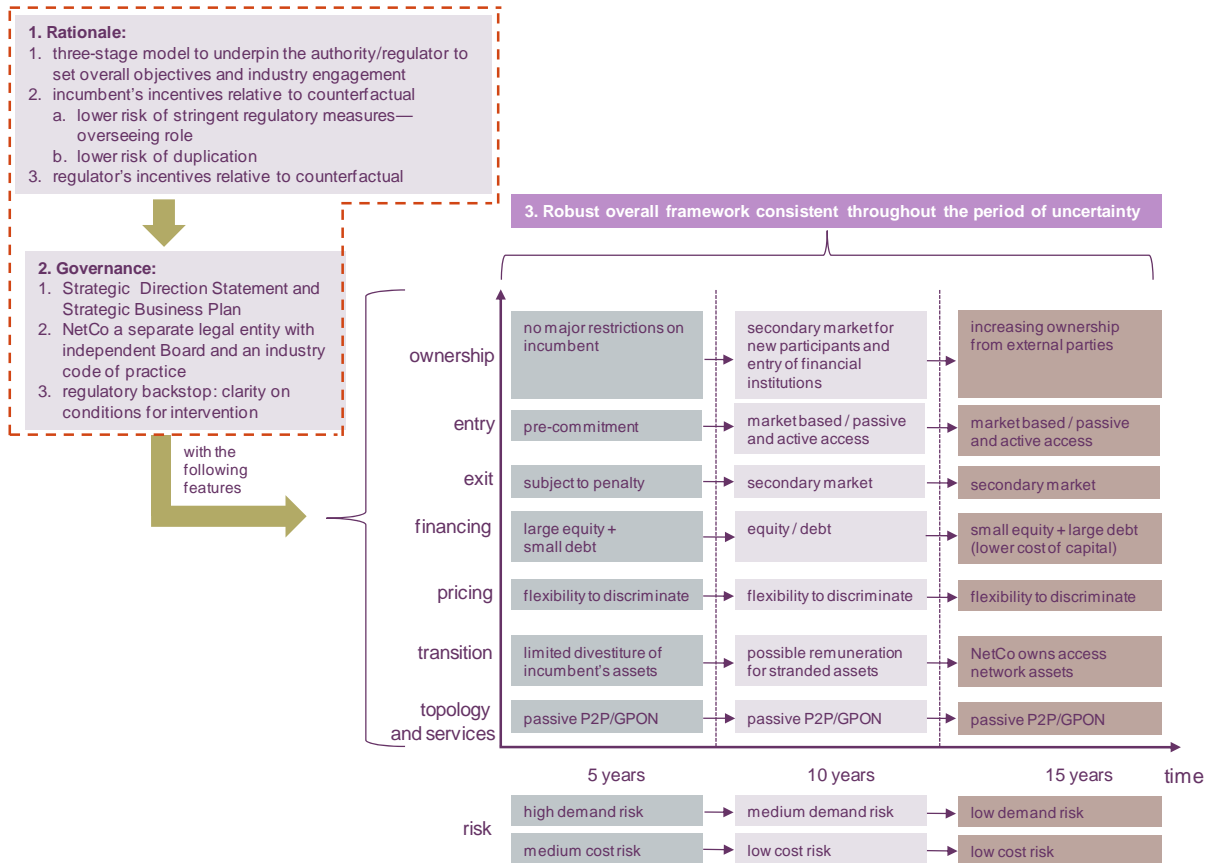
Section 1 presented the overarching framework employed in the design of the NetCo model. The three elements of the framework, illustrated in Figure 3.1, are as follows.

1. **Rationale**—overall objectives and incentives for engagement by different stakeholders.
2. **Governance**—the central building block of the NetCo model through which the incentives of different stakeholders are aligned is the governance structure, consisting of four main parts: a separate legal entity for NetCo; an SBP for NetCo in consultation and engagement with stakeholders; an industry code of conduct; and a regulatory supervision framework.

3. **Design of specific aspects of the model**—a set of detailed characteristics of the NetCo model designed to result in time-consistent features based on economic reasoning.

This section focuses on the first two elements, thereby explaining the basis for the design of specific aspects of the model, presented in section 4.

Figure 3.1 Focus of section 3



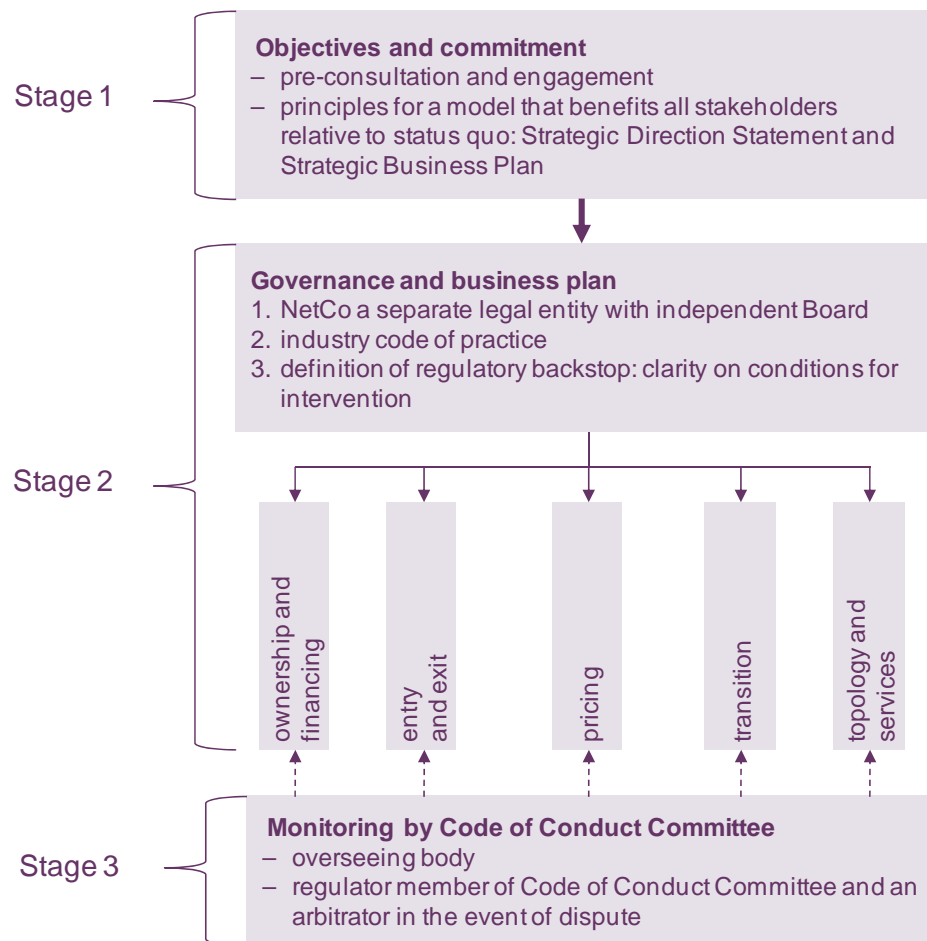
Source: Oxera.

Before describing how the rationale for NetCo results in specific governance and implementation features, this section briefly describes the overall framework of implementation of the high-level three-stage approach described above.

3.1.1 Three-tier overall framework of implementation

The design of the implementation of the NetCo model builds on the above-described market features. Specifically, the implementation proposals described below recognise the economic rationale and circumstances under which the NetCo model could be introduced. Figure 3.2 below illustrates the three stages of the high-level overarching framework.

Figure 3.2 Three-tier overall framework of implementation



Source: Oxera.

The framework can be described as follows.

Stage 1 encompasses an agreement on **overall objective** that is accepted by a group of operators and regulators, and which covers:

- the network coverage and timing of roll-out;
- the industry structure in terms of the principles for network access.

At the EU level, the Digital Agenda and the subsequent communications between the Commission and stakeholders, including the conclusions from the CEO Roundtable discussions, have effectively addressed many of the principal objectives.⁴⁴ Furthermore, national broadband plans introduced in different Member States represent country-specific objectives.

Having by now articulated the objectives, the policy-makers need to set out the basis for industry engagement and the high-level principles on various aspects of implementation, including financing and ownership, pre-commitment conditions, terms for entry and exit, pricing flexibility and topology, and services. This report could constitute a platform for discussion of such principles.

Stage 2 would consist of the development of a **Strategic Direction Statement (SDS)** and **Strategic Business Plan (SBP)**, which are envisaged as a key underpinning of NetCo's

⁴⁴ A summary of the CEO Roundtable discussions, held in spring 2011, is available at: http://ec.europa.eu/information_society/newsroom/cf/itemdetail.cfm?item_id=7211.

governance. The SDS provides the vision for the industry set out by NetCo, after having engaged with and listened to, users and customers more broadly. The SBP is the ‘end-product’ of an engagement between the parties on specific outputs (detailed plan of network roll-out and access terms), as well as inputs (conditions for participation). Once NetCo is operational, it would be a separate legal entity with an independent Board. Furthermore, an industry code of conduct would be developed to ensure that NetCo complies with its objectives, and to set the conditions under which the industry would interact with its customers. These features of governance are central to the design of the NetCo model, and are described in further detail below.

Stage 3 would involve setting out the rules and practices for interactions for NetCo on an ongoing basis. This would involve collaboration through the **Code of Conduct Committee**, including representatives from the industry and the regulator.⁴⁵

Similar high-level structures are present in other network sectors, as discussed in Box 3.1. The approaches employed in other sectors provide useful insights, given that the underpinning of the NetCo model is to achieve a certain level of investment—an objective which has not driven the current policy and regulatory framework in telecoms thus far, but which the regulators are increasingly facing.

Box 3.1 Objectives and process: insights from case studies

Similar ‘three-stage’ structures (objectives, industry agreement, oversight) are present in regulated sectors where regulators have an explicit objective to ensure and/or promote investments and often have financing duties. Notably:

- in the UK rail industry, the overall policy objectives are first agreed upon and approved by the government, followed by engagement between the network company and downstream users on how the objectives could be met, given the incentives of different stakeholders. This involves thorough consultation processes where rail operators are asked to present their envisaged business models and associated demand projections;¹
- similarly, in energy (in many European countries), the level of investment is driven in principle by generally accepted demand projections. In addition, achieving emissions reduction targets through renewables investment are playing an increasingly important role. Investments in smart grids are likely to become more significant in future to meet energy efficiency targets. Developments such as renewable and low carbon energy, necessitate close industry co-operation and co-ordination.²
- investment in airports is increasingly being determined on the basis of engagement between airport service providers and users³

Notes: ¹ For a description of the process in the rail sector, see: <http://www.rail-reg.gov.uk/pr13/about/key-stages.php>. ² An example of industry coordination is the System Development Committee, which is a pan-European umbrella committee consisting of several sub-groups with an aim to plan and design efficient deployment of transmission technologies by Transmission System Operators (TSOs). ³ The 2009 ‘Airport Charges Directive’ (Directive 2009/12) embodies the principle of consultation between airports and users in law.

3.2 Rationale

Central to the implementation of the NetCo model is a clear articulation of the mechanisms through which the model could, if appropriately implemented, result in market outcomes that benefit all stakeholders relative to the counterfactual. Agreeing on the fundamental objectives requires engagement and commitment by stakeholders, including the relevant public entities (the European Commission, national governments and NRAs).

⁴⁵ Both the SBP and the industry code are explained in further detail below.

The incentives of the three main stakeholder groups are discussed below, and feed into the subsequent description of the governance model.

3.2.1 Understanding incumbents' incentives

Against the base case, significant participation by the incumbent is taken as a prerequisite for the NetCo model to work; not only because of its financial resources and existing customer base, but also because it owns the current (fixed) infrastructure, some of which (eg, existing ducts) is likely to be needed to build NetCo in an economic manner. Clearly a co-investment model would represent a considerable change to the industry, and in that process, there would be costs and benefits to all players. In particular, the incumbent operator would prefer the NetCo model only if it would be better off participating in NetCo, relative to the future position it thinks it can achieve as a vertically integrated supplier of NGN services to its end-customers and NGA wholesale services to its (downstream) competitors.

From the incumbent's perspective there are costs against which the benefits of the NetCo model would be assessed. In particular, the incumbent would lose some (although not all) of its current control of the access network and the consequent benefits of vertical integration. Furthermore, as discussed in greater detail below, the upfront cash flows from the divestiture would need to be sufficient to outweigh the forgone revenue streams that would be generated from the existing assets in the counterfactual. Moreover, the incumbent would forgo its current access to wholesale inputs on low (or zero) marginal costs, as under the NetCo model, it would pay a wholesale charge similar to other users and face the same wholesale processes and IT-system interfaces. The quantum of these costs (or forgone benefits) depends on the counterfactual—ie, the more rigorous the regulatory measures in the status quo, the lower the costs of moving to the NetCo model.

The main benefits for the incumbent that would result from a rigorous design of the NetCo model would be the following.

- **Consistent and committed regulatory framework**—a salient characteristic of the NetCo model is the long-term commitment from the regulator (as described below).⁴⁶ Given that, by construction, the NetCo model would come with a more competitive industry structure and likely elimination of anti-competitive discriminatory practices, regulators would be more likely to commit long term than under the status quo with a single vertically integrated incumbent. There would be no revisions to the pricing framework midway through the lifetime of the investment.

As discussed above, there is an increasing regulatory pressure to introduce stringent measures to regulate copper access in a way to incentivise incumbents to migrate to fibre networks.⁴⁷ Aside from assessing the robustness of this approach, which belongs to a separate debate,⁴⁸ it is noted that such uncertainty would be avoided under the NetCo model, where the regulator has greater assurance on the network roll-out as well as more competitive market structure.

- **Pricing flexibility**—given that NetCo would have limited incentives to engage in anti-competitive pricing practices (and such behaviour would be further supervised through the code of conduct), there would be a case to allow NetCo to price-discriminate in order to reflect more closely customers' willingness to pay ('value-based' pricing), as well as geographical differences in network costs. Thus, the incumbent, via its shareholding in

⁴⁶ The fundamental role played by the regulator in making this type of investment appealing and financially viable is evident from many case studies discussed in the Appendix.

⁴⁷ European Commission (2011), 'Questionnaire for the public consultation on costing methodologies for key wholesale access prices in electronic communications', October 3rd.

⁴⁸ Different conclusions have been reached by two recent studies from WIK-Consult and Plum: WIK-Consult (2011), 'Wholesale pricing, NGA take-up and competition', April 7th; Plum (2011), 'Costing methodology and the transition to next generation access', a report for ETNO, March.

NetCo, may be able to unlock value not open to it under the stricter regulation of the self-build case.

- **Lower risk of duplication and overbuild**—as presented in section 2, the incumbent would benefit from the fact that a larger share of the industry participants would de facto commit to a single fibre network, rather than competing platforms such as ‘cherry-picking’ self-build, LTE or cable wholesale. This would in turn imply a reduction in firm-level demand risk.
- **Benefits from the broader fibre network coverage**—all service providers benefit from the value propositions enabled by the fibre-access network. A greater ability to provide advanced services in the retail market and differentiate retail offerings (including content and applications) would benefit consumers, but also imply enhanced returns for service providers. Put another way, broader network roll-out makes it more likely that compelling services (whether designed by the operators or not) will be developed and provided utilising the new network. Following the reasoning set out in sections 1 and 2, the investment in NGA may not materialise to the desired extent under the status quo regime.
- **Less reliance on own downstream performance**—while the NetCo model would come with a less concentrated industry structure in the downstream market relative to the status quo, this does not necessarily imply lower overall returns for the incumbent. The incumbent could earn NetCo returns in proportion to its ownership stake. Insofar as the returns generated from the wider NGA network are higher than they would be under the status quo, lower retail revenues could be partially or entirely offset.
- **Lower asset intensity**—depending on the degree of participation by other service providers and the extent of network coverage (and associated CAPEX requirements), the incumbent could benefit from a lower ratio of fixed to variable costs compared with building a fibre network itself. This cost structure would mean that the financial performance of the incumbent is less exposed to demand shocks (in finance terms, this means having lower operational gearing). It is, however, understood that while the financial risk could be reduced, ownership of critical assets exhibits apparent benefits to the incumbent which would be to some degree (but not entirely) forgone under the NetCo model.

The prerequisite for such an outcome is pre-commitment and regulatory certainty over time, without which the other benefits would not materialise in full, or at all. The issue of regulatory commitment is present in both the NetCo scenario and the counterfactual, and hence the question is: which model is more likely to be accepted by the regulator and why?

As discussed in greater detail below, from the regulator’s perspective, the NetCo model would have the incremental benefit that it involves commitment to more than just one vertically integrated player. There would be a commitment to a certain industry structure, but this would involve most of the market participants and a sufficient number to ensure competition in the downstream market. This makes it more appealing for the regulator to commit to ‘the rules of the game’ for a longer period.⁴⁹

3.2.2 Understanding entrants’ incentives

Entrants’ incentives to engage in the NetCo model stem from many of the same factors that drive the incumbents’ incentives—equally relevant for entrant operators are the extended network coverage, lower total industry costs (and hence lower average unit costs), and the

⁴⁹ European Commission (2010), ‘Commission Recommendation of 20 September 2010 on regulated access to Next Generation Access Networks (NGA)’, September 20th, paras 27 and 28. The Commission included even more explicit guidance in the consultation document on the circumstances under which a co-investment model does not warrant cost orientation. European Commission (2009), ‘Draft Commission Recommendation of [...] on regulated access to Next Generation Access Networks (NGA)’, June 12th, Annex III.

resulting greater scope for innovation and product differentiation in content and applications layers. Furthermore, partial ownership of the access network operator could result in gains to entrants that would not be available for them under the status quo, as follows.

- The NetCo model would mitigate or remove completely the incentives to discriminate in access processes that are manifest when the entrant is buying upstream inputs from a downstream competitor. There is evidence that the current regulatory framework has not yet produced a level playing field in many of the Member States, mainly because of non-price discrimination.
- By investing in NetCo, entrants would gain the opportunity to invest in a more attractive fibre asset than the far riskier ‘self-/over-build’ option.⁵⁰
- Increased clarity in regulation (the threshold of intervention) and less ex ante regulation overall could be beneficial relative to the current system, which entrants may perceive as burdensome and unpredictable. In particular, the (periodical) consultations and appeals processes can be lengthy.
- More influence over the architecture and roll-out plan of NetCo compared to the counterfactual, where entrants (mostly) rely on incumbents’ access networks and do not have any significant influence on the network topology (including, for example, points of handover and coordination of access interfaces).

On the other hand, under the status quo, entrants have the opportunity to ‘wait and see’ if the investment pays off without having to commit upfront. They can rely on access regulation post-investment. There is a value for this option, coupled with the relatively low CAPEX intensity and hence exposure to the demand and cost risks of investment.

Given this, entrants would be likely to join NetCo only if there were sufficient assurance that the discriminatory practices could be removed.⁵¹ Such an outcome necessitates a robust governance structure. In particular, the governance and associated rules should address any potential concerns resulting from the incumbent’s relatively high ownership share and its position as NetCo’s largest customer (at least during the initial stages). This type of provision is quite common in this form of investment scheme, characterised by large asymmetries among initial investors.⁵²

3.2.3 Understanding regulators’ incentives

Of particular interest for investors is the regulatory uncertainty issue. For the owners of the existing copper networks, the incentive to invest in deploying the next generation of fibre-optic networks is inherently linked to whether there is a regulatory framework that allows an appropriate return of, and on, investment to be earned.

On the one hand, regulators are likely to recognise that regulatory commitment is needed to incentivise the investment in deploying the NGA network,⁵³ it would also be in the regulator’s interest to have an industry structure that does not, by construction, incentivise any of the operators to undertake discriminatory conduct.

⁵⁰ For instance, when Statoil divested part of its stake in Gassled (see Appendix), it managed to make a 9 billion NOK profit on the transaction. See Reuters.com (2011), ‘UPDATE 5-Statoil Sells \$3.25 bln Gas Pipeline Stake’, June 6th, available at <http://www.reuters.com/article/2011/06/06/statoil-gassled-idUSLDE75506A20110606>.

⁵¹ Non-discriminatory treatment of all users is a key principle of the negotiating framework in place in the Dutch railway sector. See the Appendix for a more detailed description of the case study.

⁵² Such clauses have been a feature of certain pipeline projects (see Appendix). For an example of how these restrictions were applied in practice (in the context of subsequent pipeline expansions), see Mackenzie Gas Producers Group (2005), ‘Ownership Agreement Principles’, November, p. 8.

⁵³ European Commission (2010), ‘Commission Recommendation of 20 September 2010 on regulated access to Next Generation Access Networks (NGA)’, September 20th.

However, under the current industry structure, the regulators may not find it appropriate to commit to relaxing regulatory measures in the long term, given that such a long-term ‘regulatory holiday’ would imply that the incumbents’ market power (which would continue to own the access network) would be reinforced. Indeed, vertically integrated incumbents may have limited incentives to provide any third-party access at all on a voluntary basis. By contrast, in the NetCo model, the regulator would pre-commit to an industry structure that includes a sufficient number of service providers to ensure competition.

A market structure involving several operators in the retail market may not suffice to produce the desired competitive outcome overall, given NetCo’s market power as a consolidated network entity. The higher the number of downstream operators, the stronger the market power upstream. There are two principal factors that reduce NetCo’s incentives and ability to charge excessive wholesale prices:

- **Ownership structure.** NetCo would not be a structurally separated entity, but rather owned by its participants. These vertical links would constrain NetCo from charging prices that the retail market could not bear. These constraints are further reinforced insofar as NetCo is owned by asymmetric participants, some of which have more aggressive retail strategies than others.
- **Code of conduct.** As explained in greater detail below, NetCo would operate under an industry code of conduct which would determine its pricing principles, and conditions for regulatory intervention. In particular, NetCo’s pricing would be designed to allow NetCo to earn a return equal to its ex ante cost of capital, taking account of the uncertainties in the returns that can be earned in the future, at the time the investment is made.

A further potential regulatory concern is whether an industry commitment to a particular platform would be inconsistent with the regulatory objective of ‘promoting competition at the deepest level of the network’. In this respect, the envisaged model would seek to minimise, if not remove altogether, such concerns. Notably:

- NetCo’s asset base would be principally limited to the most unreplicable, ‘natural monopoly’ elements of the network. As a consequence, all operators would be able to compete on quality of service by investing in active electronics and by innovating in the applications and content layers of the network. Put another way, the cost of deploying dark fibre is largely fixed and hence does not depend on the extent or form of usage, and further, there is limited scope for innovation in the network layer as the physical fibre connections are the same;
- as explained in further detail in section 4, in areas where it would not be economically viable to deploy unbundlable point-to-point networks, the model is designed to ensure maximum scope for product differentiation and the products would be priced in a way that mimics the economics of unbundling. In this respect, Ofcom’s principles for virtual unbundled local access provide a useful starting point.⁵⁴

These features—explained in further detail below—imply that the objective to promote facilities-based competition would not be undermined to any significant extent by the co-investment model. On the contrary, to the extent that network duplication is avoided, operators would have greater financial resources to invest in other parts of the network or services.

As Table 3.1 summarises, many of the advantages driving the NetCo model are common across the three stakeholder categories. It would be unreasonable to assume that NetCo

⁵⁴ Also see Vodafone’s description of the key aspects of NGA bitstream over which access seekers require control: Vodafone (2011), ‘Key Principles for wholesale access over next generation fixed networks’, The Policy Paper Series, 13, June.

would not come with costs in some respects, relative to the counterfactual. These costs, discussed above, are also summarised in Table 3.1.

Table 3.1 High-level overview of the likely benefits of NetCo to different stakeholders

| | Benefit relative to status quo | | |
|---|--|----------|-----------|
| | Incumbent | Entrants | Regulator |
| Upfront cash flow from divestiture of assets | Moderate | Low | n/a |
| Lower risk of duplicate infrastructure | High | Moderate | Low |
| Greater coordination of investment and certainty for retail offerings | Moderate | High | Moderate |
| Greater network coverage | Moderate | Moderate | High |
| Greater regulatory certainty | High | High | n/a |
| Less price and non-price discrimination in access and fewer disputes | Low | High | High |
| | Cost relative to the counterfactual | | |
| | Incumbent | Entrants | Regulator |
| Future cash flows from sunk copper and fibre assets | Moderate | Low | n/a |
| Loss of zero-marginal-cost access/new line charge payments to NetCo | Low (given the envisaged pricing structure) | n/a | n/a |
| Control of access network | Moderate (depends on the form of regulation) | n/a | n/a |
| Option to wait-and-see and cherry pick | Low | Moderate | n/a |
| Diluted control of pricing and returns | n/a | n/a | Moderate |

Source: Oxera.

Given the nature of the investment, there are benefits gained and costs borne by all stakeholders. The quantum of net benefits depends on how the status quo is defined and perceived. The above indicative assessments assume the characteristics set out in the beginning of this section. These assumptions on the counterfactual seem reasonable in light of regulatory proposals put forward thus far, but it would seem necessary for the industry to gain further understanding of the design of the regulatory framework going forward in the absence of NetCo or something similar.

Under NetCo, the incumbent gains greater certainty on its NGA investment (relative to the status quo) in return for ceding some control over the access network and retiring legacy of copper assets. The entrants share many of these benefits and gain from reduced access discrimination in return for upfront commitments. All participants and the regulator benefit from a larger NGA deployment. The ownership structure and governance mechanisms are designed to achieve legitimacy, enhance industry coordination and facilitate appropriate dispute resolution and regulatory oversight. Hence, on the whole, the NetCo model would seem to balance conflicting interests and exhibit net benefits to all parties involved.

3.3 Governance

An acceptable governance structure is a prerequisite for all the specific attributes of the NetCo model. If the governance structure is not specified such that it ensures sufficient and proportionate decision-making power to all parties—and hence strikes a balance between the above-described incentives—it could prevent implementation of the model.

The economic problem to be resolved by the governance structure stems from asymmetric bargaining power: while the bargaining power of a monopolistic upstream operator would be constrained by the co-ownership structure, the likely large ownership and consequent voting share of the incumbent, coupled with its high retail market share, necessitates measures to protect the interests of minority participants.⁵⁵

As established above, the NetCo model is likely to require significant commitment and financial participation from the incumbent, the incentives of which depend on the returns from network investment that might not materialise relative to the forgone benefits of vertical integration.

The incumbent's potentially high equity share does not lead to discriminatory treatment per se. However, as set out below, in order to ensure alignment of incentives, an SBP and an independent NetCo Board working to a code of conduct, and with regulatory oversight, would need to be introduced.⁵⁶ Thus, the code needs to generate bargaining power for smaller owners, given entrants' incentives: returns from non-discrimination (between participants) and an enhanced network would materialise only if it could be ensured that they feel they have sufficient influence to protect their interests compared with the counterfactual. On balance, the code seeks to ensure non-discriminatory behaviour (ie, NetCo maximises collective returns) without constraining the incumbent too much relative to the counterfactual.

Furthermore, the governance structure needs to be defined in a 'static' sense (ie, with the structure and code defined firmly ex ante) and in a 'dynamic' sense (ie, to provide sound mechanisms for ongoing monitoring and continual decision-making). The governance structure presented below seeks to meet these objectives. A separate legal entity per se could potentially represent a valid instrument to protect minority shareholders. Indeed, by creating a separate legal entity, automatic protection of minority shareholders is guaranteed—to some extent—by the set of default rules that characterise most EU legislative frameworks.⁵⁷ This type of rule may potentially ensure a less 'intrusive' form of protection of minority shareholders.⁵⁸

3.3.1 Features of governance structure

The envisaged governance structure is summarised in the box below.

NetCo would be designed as a separate legal entity with an independent Board, an industry-wide SDS and SBP, together with an industry code of conduct (NGICC). In this way, it would ensure a platform for all participants to influence decision-making. Incumbent majority equity control may not be a problem, insofar as the defined code of conduct and regulatory backstop are effective.

The key features of the NetCo governance model are as follows.

Feature 1: NetCo would be created as a separate legal entity with an independent Board

NetCo would be owned by a combination of the current owner of the copper network and a number of service providers. Such a legal entity would operate with an independent Board, which would appoint a CEO with a fiduciary duty to all investors, irrespective of their ownership stakes.⁵⁹

⁵⁵ This asymmetric development in the initial ownership structure is common in the energy sector, in the context of pipeline development projects. See Table A2.2.

⁵⁶ Similar forms of light-touch regulation can be found in other EU nations too. For a description of how these frameworks have been implemented in the Netherlands, see the Appendix.

⁵⁷ Inherent asymmetries among stakeholders were one of the issues of the Dutch rail industry which were dealt with through the inception of a consult-and-negotiate framework.

⁵⁸ See Appendix for further description.

⁵⁹ The introduction of a fiduciary duty on a network operator is not a new phenomenon. In the Norwegian energy sector, for instance, Gassco is obliged to perform its special operatorship duty with due consideration for the interests of all system users,

NetCo's Board would be independent and incentivised to maximise NetCo's performance as a collectively owned entity. NetCo would thus have an incentive to deliver the right performance and at a lower cost. The Board would run the construction process; construction risk would hence be on NetCo and shared between financial participants.

Case studies from the energy sector indicate that the definition of the Board's composition often appears to represent a crucial moment in the process of reconciling potentially diverging interests among project participants.⁶⁰ The NetCo Board would consist of independent members and members representing the participants. At least 40% of the members with voting power would be independent of any of the participants. Voting shares within the 60% participant share would be proportionate to ownership (for instance, one Board seat per 10% of equity, which is the minimum ownership stake discussed in further detail in section 4).

High standards of corporate governance would apply.⁶¹ Any potential issues associated with the incumbent majority would be addressed by the NGICC (see Feature 3). An independent Chairman would be envisaged to ensure a balance of interests across a diverse set of participants.

Feature 2: governance would be designed to meet the overall investment objective through an industry-wide vision and an SBP

A NetCo SDS would determine the vision for the NGA broadband sector over a long-term timeframe (20–30 years). This would set out the NetCo Board's view of what a network access service will look like over a long time period, and how it will satisfy the broad range of potential service providers and end-users of high-bandwidth services.

The elements of NetCo's SDS could be:

- a summary of research on what outputs customers and users need—the NetCo footprint;
- a set of priorities, as established by the NetCo Board;
- a view on how to deal with risks in the long run;
- a high-level view on the financing needs of NetCo.

This SDS would be underpinned by an SBP, detailing the inputs and outputs that NetCo would deliver over a sufficiently long timeframe (ten years, corresponding with the estimated construction time). The SBP would be determined to cover a long-term horizon consistent with the lifetime of the fibre assets.

These plans, which would ordinarily be common practice in an organisation dealing with very long-lived assets, would be developed in extensive consultation with all stakeholders, irrespective of whether they are owners of NetCo or new entrants to the market.⁶² This process of engagement is designed to secure the buy-in of stakeholders (eg, customers, users, investors and regulators) and legitimacy on what NetCo would be delivering and at what cost.

Specifically, the following attributes would be central to the SBP.

- Longer-term guarantees of funding would be required from the NetCo participants so that the agreed SBP would actually be delivered. As discussed in section 4, a ten-year

treating all companies equally when transporting Norwegian gas. Further details on the Gassled case study can be found in the Appendix.

⁶⁰ See Appendix.

⁶¹ For an overview of the current standards in the EU and areas where improvement is likely to be focused, see European Commission (2011), 'The EU corporate governance framework', Green Paper.

⁶² Incentivisation of customer engagement is becoming increasingly common in the EU. For example, the recent introduction of the RIIO framework by Ofgem in the UK, or the inception of light-touch regulation frameworks in the Netherlands.

period would be consistent with the expected period of demand and construction risk, and would reflect the long lifetime of the fibre assets.⁶³

- NetCo would have a clear mandate to set out in the SBP the priorities for the industry, supported by regulatory oversight, including licence conditions for NetCo. The SBP would set out a voting-type structure that would result in NetCo taking decisions in the collective interests of all NetCo owners.
- A network roll-out plan would be specified in as much detail as possible, to include a description of the timing of deployment by geographic area (points of interconnection), topology choices and accessibility arrangements (eg, interface standards).⁶⁴
- Risk allocation and accountability over time would be clearly articulated clearly ex ante as part of the SBP. This would include clearly specified rules of entry and exit. As discussed in further detail in section 4, market-based mechanisms would be introduced to enable late entry (through secondary trading). Entry conditions would set out minimum commitment periods (ten years, explained below), together with penalty/sanction mechanisms for any breach of pre-commitment. In the medium to long term, the SBP would encourage owners that do not have an interest in the downstream markets.
- The right incentives would be ensured through management remuneration schemes (similar to those operated by Openreach in the UK and proposed for Chorus in New Zealand), with management bonuses dependent on NetCo's performance, both financially and in delivering its SLAs.
- Unlike in the UK water, airports and rail sectors, NetCo's mandate would not depend explicitly on regulatory acceptance, but rather would be reinforced by the threat of regulatory intervention (as articulated in the NGICC, see below).
- Changes in output requirements would be developed through the SBP engagement process. Given the uncertainty surrounding the demand for and construction of the NGA network, the SBP would determine circumstances under which revisions might be required, and the accountability of participants for any unexpected scenarios, such as cost over-runs. Risks of overbuild would be internalised with well-informed stakeholders, rather than dealt with by a regulator, which is less well informed.

The relative power of the players would change as NetCo is agreed and rolled out. Hence, it would be necessary to design the engagement process in such a way that protects the interests of all those who have pre-committed. As explained under Feature 3, any additional (emerging) changes to SBP would be reviewed by the code of conduct committee.

Feature 3: an NGICC sets the conditions under which NetCo interacts with participating service providers and third-party entrants

The NGICC forms the basis for the technical features of the network, supervised by an external party. The code would operate ex post (or in a subordinate way to the high-level regulatory framework) and its principal roles would be to:

- ensure compliance with the SBP and the associated investment plan and predetermined SLAs for wholesale processes;
- provide a platform to process any potential deviations from the SBP.

⁶³ Section 4 and the Appendix also show that the ten-year period is comparable with precedents from other sectors.

⁶⁴ A summary of the CEO roundtable discussions, held in spring 2011, is available at: http://ec.europa.eu/information_society/newsroom/cf/itemdetail.cfm?item_id=7211.

The NGICC would determine the circumstances under which any disagreements between participants (or external parties) would be processed by an independent arbitrator. This type of scheme has been implemented, for example, in the energy sector in many European countries (see Box 3.2 below). In the UK electricity sector, the self-governing code for users of the national high-voltage electricity transmission system (the 'Connection and Use of System Code', CUSC) specifies that the regulator or Electricity Arbitration Association will step in if the code of conduct fails to yield a successful dispute resolution.⁶⁵

A reduced and narrowly defined scope of 'code' and participation from the wider stakeholder group could ameliorate the otherwise potentially outsized influence of the incumbent. The NGICC would be defined ex ante and its role would be to protect minority owners and users on an ongoing basis over time. The Code Committee would comprise:

- a chairperson (not from any of the participants);
- ten representatives from participants (in line with energy codes, for example);
- a representative from the largest financial investor (where relevant);
- a representative of customers' interests from an end-users' group (as in the CUSC in the UK energy sector); and
- a representative from the regulator.

The NGICC would also set out the principles for (unregulated) access terms for third-party entrants (such that the returns of NetCo as a collective entity are maximised).

Box 3.2 NGICC: lessons from elsewhere

The NGICC is a feature of NetCo where lessons from other sectors and countries seem applicable and could be used as a basis of design. There are particularly relevant insights in terms of issues that have been identified in other sectors where 'code'-based governance has been applied.

Industry codes vary considerably by sector and by country. For example, in the UK energy sector, there are several codes for aspects such as technical features, access terms and investment planning. Although the code processes have been argued to be burdensome and complicated, and proposals for reform have been put forward, they are considered important, and the reforms sought are changes to the codes, rather than removing them altogether.¹ Industry codes (and other self-regulation schemes) are also employed in other sectors and countries.

The Appendix provides an overview of the self-regulation mechanisms applied in the UK, Germany and the Netherlands. Some of the key findings include the following.

- The codes can provide a basis for implementing changes to the business plan on an ongoing basis (including changes to contracting).
- The UK energy codes (CUSC, BSE) tend to deal with amendments one at a time: NetCo policy changes may require a staged approach (a policy round, followed by a separate implementation round) and simultaneous changes 'in the round'.
- The code needs to ensure appropriate analysis of the impact of any changes, to avoid any asymmetry in the influence of parties with different equity stakes.
- Codes can be inefficient if there are no limits on tabling alternative proposals for consideration, or if particular rules are subject to constant amendments. In a fast-moving market, NetCo's (CAPEX) decisions should be streamlined and the code should not allow lengthy debates and appeals processes.
- The timing of the process means that investment and capacity planning need to be coordinated. Such a requirement has been observed in the context of energy markets (eg, in the Netherlands) and would be applicable to NGA network roll-out or expansion, for example, with respect to GPON capacity upgrades.

⁶⁵ This is consistent with the approach in the Dutch rail sector, where there appears to be historical evidence of non-uniform treatment of investors by infrastructure managers (after the vertical separation process that characterised the industry). See the NMa Dutch rail case study in the Appendix.

- Consultation processes favouring the incumbent over smaller providers and investment tailored to the needs of larger downstream companies could be a concern. This problem has arisen in the aviation sector, for example. Further to the NGICC, which is a more formal platform, the NetCo management and Board should have the right incentives (potentially through pay schemes) to avoid such asymmetric treatment.
- A lesson from some self-regulation schemes is that it can cause serious problems if SLAs are not defined in sufficient detail ex ante. This would be important to NetCo since the SLAs define the conditions for non-discrimination (eg, number of days to connect/disconnect, fault restoration times, switching operator times, broadband speed and total downtime).

Notes: ¹ The Brattle Group and Simmons & Simmons (2008), 'Critique of the industry codes governance arrangements: A report for Ofgem', June.

Feature 4: a well-understood regulatory backstop would provide sufficient protection for smaller participants and users more widely

The regulator's role would focus on ex post monitoring of the market functioning. This would consist of a set of principles, which, if not met, could lead to intervention under regulators' current powers. Specifically, as explained in further detail in section 4, the regulator would:

- facilitate and oversee the business planning and delivery process of NetCo;
- oversee Feature 4 and arbitration (see discussion on 'NGICC and the proposition on 'Regulation');
- have the option to refer unresolved disputes to a relevant appeals body.⁶⁶

The circumstances under which the regulator would intervene would need to be specified ex ante in the NGICC. The two main types of situation that may require such intervention are as follows.

- If there are proposals in relation to NetCo's CAPEX that are out of line with the SBP and are proposed by the majority (either one or more participants with a collective majority of equity), but are not supported by all participants. This situation would be addressed through resolution mechanism chaired by the regulator. For such proposals, the NRA would manage the process and make a decision with an appeal backstop. Less 'material' amendments (contracting, payments systems, maintenance, operations) would be decided by the NetCo Board.⁶⁷
- If there are complaints backed by evidence on discriminatory behaviour in wholesale processes (monitoring of key performance indicators (KPIs) against predetermined SLAs), the regulator would seek to resolve the disputed processes through arbitration. Regulatory processes would be subject to pre-determined timescales to ensure quick and efficient dispute resolution.
- If NetCo's pricing is not in line with efficient market functioning, manifested through high returns relative to the cost of capital at the time of investment (section 4 outlines the principles for the 'safety cap').

As explained in section 4, the NetCo model would require regulatory changes only with respect to the particular assets owned by NetCo and the services it provides. Other wholesale services, and associated SMP positions and regulatory remedies, would be retained and be subject to standard market reviews. As such, the NetCo model would be introduced in a manner that does not require substantial changes to the existing EU Framework.

⁶⁶ This is the approach taken in the UK energy sector, where the CUSC defers all unresolved disputes to either the regulator or the Electricity Arbitration Association.

⁶⁷ This type of structure has been proposed for the UK energy code. The Brattle Group and Simmons & Simmons (2008), 'Critique of the industry codes governance arrangements: A report for Ofgem', June.

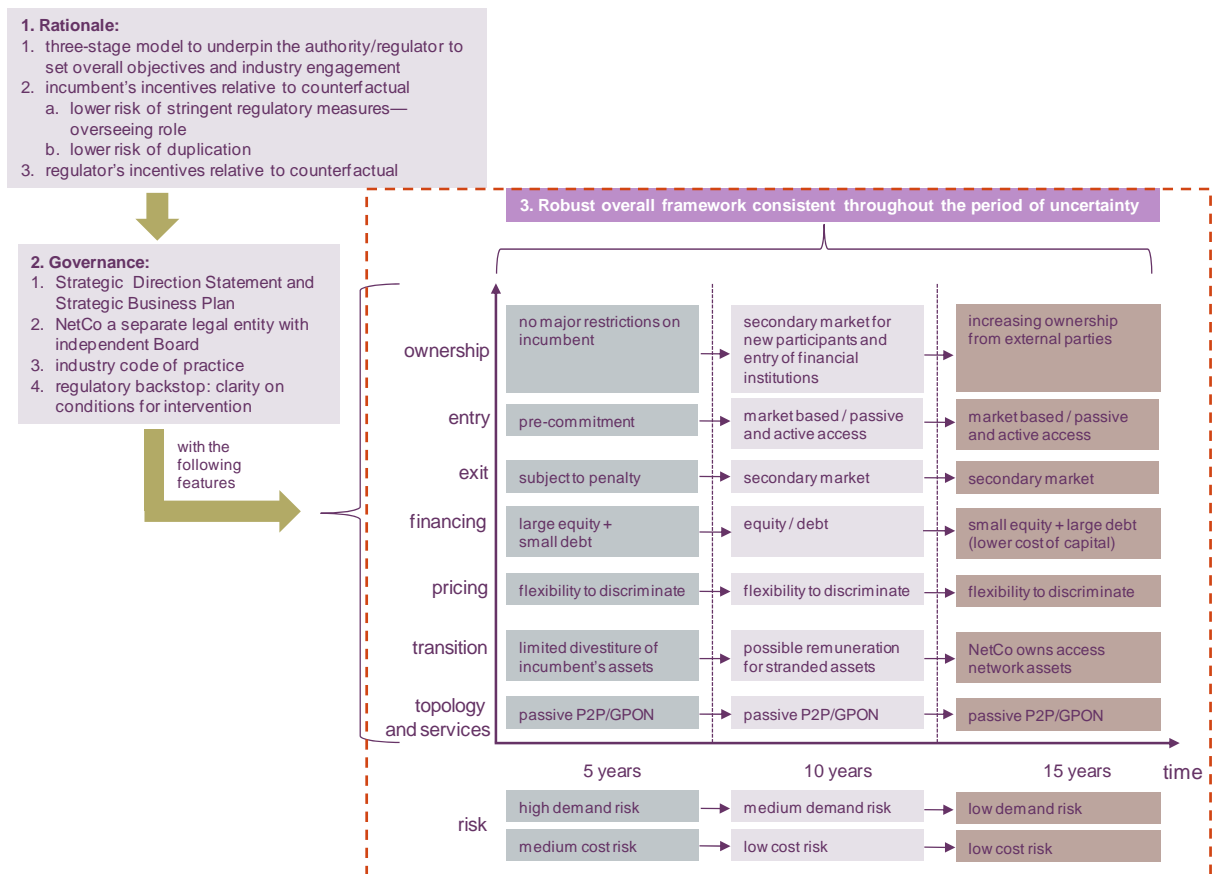
4 Implementation: design of the specific features of the NetCo model

Drawing on the conceptual analysis presented in section 2, and the overarching governance structure set out in section 3, this section presents a ‘blueprint’ of the NetCo model. The specific aspects of the model discussed in this section are:

- stakeholder commitment;
- ownership and financing;
- entry and exit;
- pricing;
- transition and treatment of the incumbent’s legacy assets;
- topology and services;
- regulation.

Figure 4.1 illustrates how these aspects fit into the overall framework, recognising the necessary time-consistency to ensure a robust model.

Figure 4.1 Focus of section 4



Source: Oxera.

Behind each of the specific proposals presented below is an economic rationale, as well as precedents from other jurisdictions where similar considerations have been relevant in the past, where applicable. The propositions on key features are first presented, followed by assessment of the specific attributes of each of the features discussed.

Box 4.1 Summary of propositions

- **Stakeholder commitment**—operator participants commit to finance NetCo for ten years, during which exit is possible but subject to a financial penalty. The regulator has the power to influence NetCo’s behaviour through its supervisory role, but commits not to change the rules of the model during a 15-year period, given that the overall governance structure described in section 3 is designed to legitimise the operations of NetCo.
- **Ownership and financing**—from the time of its launch, NetCo is (primarily if not exclusively) funded by operator–participants; with investment from financial investors expected once the construction phase is completed (and the demand uncertainty is lower). NetCo’s financing and capital structure will evolve over time. As construction and demand risk evolve, different forms of financing and corporate governance could emerge (eg, acquisition of a substantial stake in NetCo by infrastructure or pension funds).
- **Entry and exit**—participants commit to finance NetCo’s CAPEX and OPEX. There would be a commercial market for ownership stakes. Later entry and exit will be achieved through commercial agreements, subject to pre-defined criteria for participation.
- **Pricing**—NetCo’s pricing is designed to provide sufficient lifetime remuneration on investment, given the risk at the time of investment. To ensure maximum output in an uncertain environment, NetCo is free to set its own prices and allowed to price-discriminate in order to reflect end-users’ willingness to pay and geographical differences in costs.
- **Transition and treatment of the incumbent’s assets**—legacy assets that can be used as inputs for NGA are, at least at the time of the launch, leased from the incumbent at cost-reflective tariffs. If some incumbent assets become stranded relative to the counterfactual of ‘no NetCo’, reasonable remuneration is ensured and could be recovered through NetCo’s pricing of capacity.
- **Topology and services**—as far as is economically feasible, NetCo commits to deploy point-to-point passive networks. Where alternative topologies already exist, or are otherwise necessary, NetCo will provide active access.
- **Regulation**—the regulator’s role is to commit firmly ex ante and to oversee the functioning of self-regulation; where disputes arise, the regulator could be the first independent arbitrator.

The rationale for these core propositions is presented below, together with further practical options.

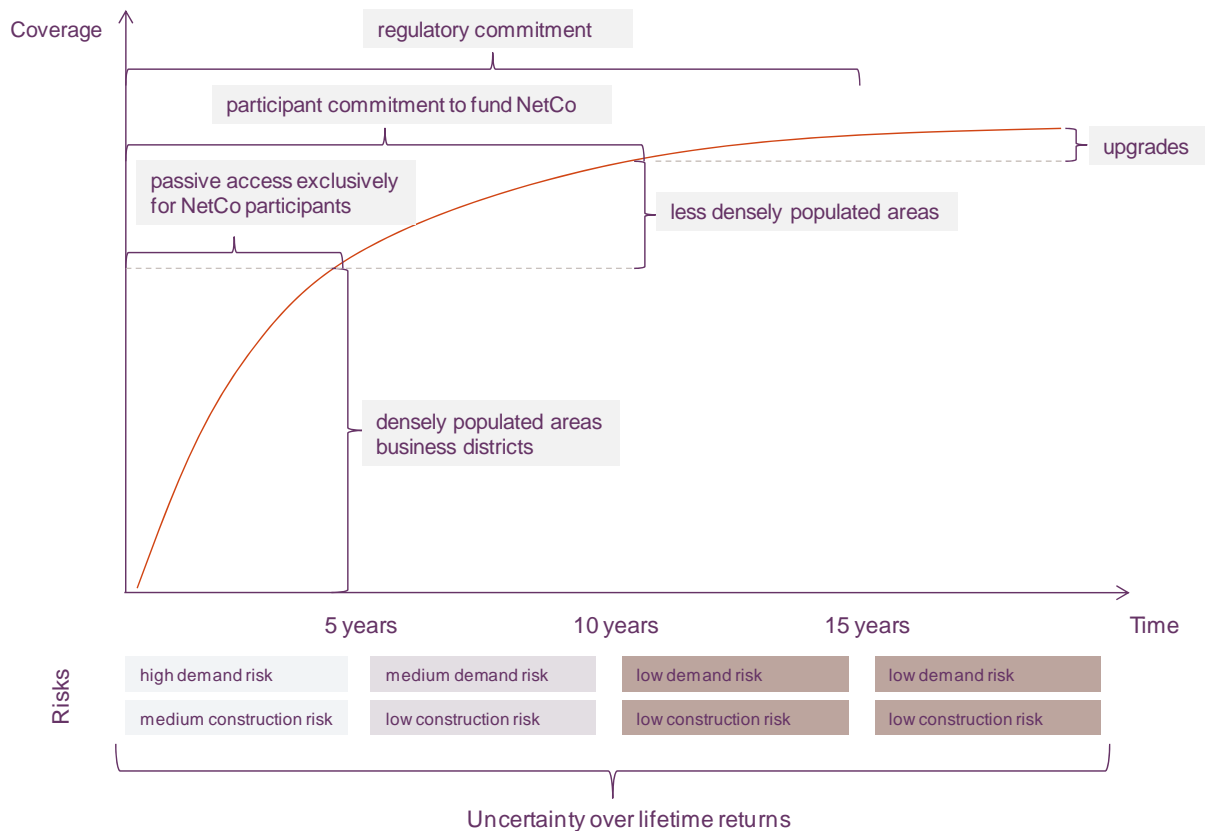
4.1 Stakeholder commitment

The economic case for NetCo relies on significant commitment by participating operators. Moreover, the regulator needs to commit for a time period that is consistent with the period of demand uncertainty and construction risk, and takes into account the lifetime of the assets.⁶⁸

As an illustration, Figure 4.2 gives an overview of the potential timeline of NGA network roll-out, and the evolution of the associated risk profile over time.

⁶⁸ For instance, in the past, Ofgem has guaranteed predetermined revenue streams for the owners of transmission links, explicitly excluding automatic price reviews. See the Appendix for further details.

Figure 4.2 NGA network roll-out and evolution of risk profile over time—an illustration



Source: Oxera.

While the coverage estimates and time periods shown in Figure 4.2 may be open for further discussion, this schematic provides a basis for assessing appropriate time periods for stakeholder commitment. On the basis of discussions with industry experts, the following assumptions seem plausible.

- Given that the network roll-out time is dictated by the economies of density, the majority of the target network coverage can be achieved in 5–10 years. During this time period, NetCo would gain further understanding of the evolution of asset prices (which are likely to remain relatively stable for dark fibre), as well as the civil engineering costs.
- Demand risk would be highest at the start of the roll-out plan, given that services and applications provided over fibre networks are, to a large extent, developed only once there is a platform over which they can be provided (or at least a sufficient commitment for a platform to be deployed). While impossible to project accurately, it is estimated that the demand uncertainty would be substantially diluted after ten years—a time period consistent with certain other large-scale ICT investments witnessed in the past years, including 3G spectrum licences and associated network upgrades,⁶⁹ and DSL broadband networks. This seems consistent with the views of some industry experts:

Historically there has been a 10-year interval between the ratification of a new generation standard and the time when its device shipments overtake those of the previous generation.

⁶⁹ Industry commentators have noted that it took almost ten years for mobile broadband to become adopted by a critical mass of consumers.

As an example, ABI Research reported that shipments of 3G handsets overtook 2G handset shipments only in Q1 of 2010.⁷⁰

From an economic perspective, the commitment period should be sufficiently long to ensure that NetCo has guaranteed financing over the period of significant demand uncertainty in the beginning, given the probability of different demand outcomes. Furthermore, from the regulatory point of view, any revisions to the regulatory framework and to allowed returns midway through the lifetime of existing investments would affect the ex ante profile of the investment, and may not allow investors to expect to recover the original investment and earn the required return. It is therefore essential to ensure a sufficiently long commitment to a certain regime by the regulator as well as the participating operators.

4.1.1 Features

Three features are considered necessary to encourage commitment as a result of these underlying economic factors: long-term regulatory commitment for 15 years, ten-year commitment by initial participants, and commitment to network roll-out plan and switchover.

Feature 1: long-term regulatory commitment for 15 years

As articulated above, regulators have greater incentive to pre-commit the less concentrated is the consequent downstream market. Hence the incumbent would be more likely to achieve regulatory certainty through NetCo than by itself. Specifically, the regulator would commit not to intervene unless there are breaches to the NGICC and arbitration is required (see section 3). Furthermore, the regulator would pre-commit not to intervene if market prices exceed expected cost-based prices in the event of excess demand relative to central expectations (ie, there would be no claw-back mechanisms triggered just because NetCo earns a return above its cost of capital).

Under the proposed model, the regulator would allow (but could not guarantee) NetCo to earn a healthy rate of return over the lifetime of investment.⁷¹ NetCo's returns would need to reflect the demand uncertainty and construction risk inherent in NGA deployment. This would be achieved through pricing flexibility similar to that currently allowed by some NRAs in Europe (Ofcom, BNetzA, Ficora).⁷² Only if NetCo's overall returns breached a pre-determined 'safety cap' would the regulator be entitled to intervene.

While the duration of the construction and demand risk vary by sector, it is helpful to compare the proposed timeframes with precedents from other sectors. By way of an example, the 15-year timeframe seems consistent with contract periods proposed by the UK Department for Transport for rail franchises (15–22.5 years):

In general, train operators advocated 15 year franchises at minimum, with some supporting the maximum option of 22.5 years. It was argued that longer franchises would allow operators to develop better relationships with their customers and suppliers, and work more innovatively. It was also argued that longer franchises would provide greater opportunities for operators to respond to economic changes and make more investment in the network. This view was supported by some user groups and members of the public.⁷³

Furthermore, examples from a range of infrastructure sectors provide an indication of what governments and regulators view as appropriate lengths for licences—see Box 4.2.

⁷⁰ See the Airvana website, 'LTE Femtocells'. Available at: <http://www.airvana.com/technology/lte-femtocells/>.

⁷¹ For example, this type of approach was adopted by Ofgem when tendering offshore wind transmission links. On that occasion, Ofgem guaranteed predetermined levels of revenues for winning bidders for a window of 20 years. See Ofgem (2009), 'UK Offshore Transmission: Investment Opportunity', July, p. 5.

⁷² See the Appendix for a summary.

⁷³ Department for Transport (2011), 'Reforming Rail Franchising: Government response to consultation and policy statement', January.

Box 4.2 Duration of licences in other regulated sectors

There appears to be limited stated economic rationale for the duration of licences in other regulated sectors, but a longer-term licence would seem to provide additional security and certainty to investors in many other infrastructure sectors.

Most licence-based sectors in the UK have a licence duration of 25 years and a notice period of ten years (meaning a total of 35 years), the exception being the energy sector, where licences last ten years and have a notice period of 25 years (see table below). (The concept of licence revocation does not have a direct read-across in the telecoms sector, except in relation to spectrum.) A comprehensive summary of licence periods across different sectors is provided in the Appendix.

Duration of licences and notice periods in the UK

| | Duration of licence (years)* | Notice period (years)** |
|---|------------------------------|-------------------------|
| Electricity | | |
| Generation | 10 | 25 |
| Distribution | 10 | 25 |
| Supply | 10 | 25 |
| Transmission | n/a | 25 |
| Gas | | |
| Shippers | 10 | 10 |
| Suppliers | 10 | 10 |
| Transporter*** | 10 | 10/25 |
| Water | | |
| Water-only | 25 | 10 |
| Water and sewerage | 25 | 10 |
| Rail infrastructure (Network Rail) | 25 | 10 |
| Air traffic control (NERL) | 20 | 10 |

Note: * 'Duration of licence' refers to the minimum number of years that have to elapse before the regulator can give a revocation notice to the licensee. ** 'Notice period' refers to the number of years of notice that must be given by the regulator before terminating the licence. *** 'Transporter' refers to transmission and distribution. Source: Companies' licences.

Similarly long concessions appear to be rather common across other countries in continental Europe:

- In the transport sector, the recent award of a 40-year concession by the Portuguese government for the design, construction, financing, operation and maintenance of the Poceirão–Caia stretch of a high-speed railway line exemplifies the extended amount of time required to reward investments in the sector.¹
- In the water sector, key examples include that of Veolia–AFS—a consortium that was granted a 20-year licence to operate a major water treatment plant in Oslo after designing and constructing the plant—and that of the Delfluent Consortium—linked to the award of a 30-year concession to design, build, finance and operate a wastewater treatment plant in The Hague.²
- In the energy sector, the Portuguese choice of awarding a 40-year concession for the transmission of natural gas to the system operator REN Gasodutos³ or the German choice of limiting electricity and gas concessions to a 20-year timeframe⁴ confirm the long-term payback period of investments in this industry. The same type of evidence emerges from the Danish renewable energy sector, where DONG Energy was recently awarded a 25-year licence to build and operate the Anholt offshore wind farm.⁵

Notes: ¹ See Grupo ACS, 'Concession Projects'. Available at: http://www.grupoacs.com/index.php/en/c/activities_concessions_concessionsprojects. ² See Veolia Environment (2003), 'Oslo municipality awards construction of Norway's largest water treatment plant to Veolia Water', press release, October 24th. See Veolia Water, 'Harnaschpolder, a major achievement for the first ever public-private partnership in the water industry in the Netherlands', press release.³ See EDP, 'Gas System in Portugal'.

Available at:

<http://www.edp.pt/en/aedp/sectordeenergia/SistemaGasPortugues/Pages/SistemaGasPortugal.aspx>.⁴ See Bundesnetzagentur (2010), 'Bundeskartellamt and Bundesnetzagentur publish joint guidelines', press release, December 15th. ⁵ See Danish Energy Agency, 'Anholt Offshore windfarm - 400MW'. Available at: http://www.ens.dk/en-US/supply/Renewable-energy/WindPower/offshore-Wind-Power/anholt_tender/Sider/Forside.aspx. See also Danish Energy Agency (2009), 'Tender specifications for Anholt offshore wind farm 30 April 2009', May, p. 4.

Feature 2: ten-year commitment by initial participants

Participating operators would need to demonstrate their long-term business plan in terms of viability to commit to the NetCo platform, given the demand and cost uncertainty. This would not involve information sharing in the sense that could create competition law issues; rather, the participants would need to demonstrate that they are financially sound in terms of pre-determined criteria (eg, credit rating, solvency) and committed to the SDS. Having committed for a minimum of 10% of NetCo's OPEX and CAPEX over the first ten years of operation, the NetCo Board should be permitted to judge objectively whether all proposed investors have the necessary resources to honour their commitment and reject any bid which they did not consider sufficiently robust. The criteria for such an assessment should, as far as possible, be published prior to the acceptance of bids and would constitute transparent conditions including, but not limited to, the credit rating of bidders.⁷⁴ The 10% minimum will ensure sufficient commitment to NetCo while keeping the number of shareholders to a manageable number, to ensure decisions can be taken efficiently. This process will protect not just NetCo, but also the co-investors. The commitment period of ten years should be sufficiently long to allow time for the network to be constructed (ie, the period of high and medium construction risk).

However, the commitment period should not be too long: the NetCo model could be perceived as unattractive by participants if it precluded them from seeking to invest in alternative technologies, the capabilities of which are not yet known, but which may become viable solutions after 10–20 years (ie, within the estimated payback period of NGA networks).

As noted above, other large-scale investments with demand uncertainty provide an indication of the time period after which demand has materialised or has proven to be lower than expected. A ten-year commitment period would seem sufficient to provide certainty for NetCo, while ensuring an exit route, should some of the participants wish to adopt alternative technologies at a later stage.

Feature 3: commitment to network roll-out plan and switchover

To avoid the costs of maintaining parallel networks or implementing anchor products, all participants would commit to a predetermined NGA roll-out and the necessary changes in topology. The reason why this is required is two-fold.

- Inefficient OPEX would be incurred in maintaining parallel networks unless all participants commit to predetermined NGA roll-out and the necessary changes in topology. These costs are likely to be a feature of the status quo scenario, given that there is no industry consensus on the network roll-out plan and topology, and regulators are likely to 'protect' entrants' current (A)DSL investments, whether through a form of 'anchor product regulation' or by ensuring a sufficient transition period over which parallel copper access would be maintained.
- The copper switch-off would be designed such that the impairment of DSL electronics assets would not exceed the benefits of OPEX savings to NetCo. Given the short asset lifetimes (the asset lifetime of DSL electronics is around five years) and relatively

⁷⁴ An example of this type of pre-commitment is the Atlantic Wind Connection case study. At the launch of the joint venture, the importance of introducing a requirement on the part of utilities to purchase a certain percentage of their electricity from renewable sources was considered (see the Appendix).

modest CAPEX associated with DSL electronics, the participant operators would be expected to prefer minimisation of the dual running costs.

All participants would therefore commit to use the new platform, where it has been deployed. Participants will migrate to NGA regardless of whether the existing DSL assets are stranded. NetCo, through its operators, would ensure that customers are migrated to services that are at least equivalent.

There might be unbundlers that decide not to become NetCo participants. These stakeholders could influence the process during the initial consultations and the design of SBP. While a swift migration to NGA would be in the interest of NetCo's shareholders, the third-party OAOs need to be migrated from LLU to active access in an orderly fashion (in terms of pricing of LLU during the period of dual running and speed of migration).

4.2 Ownership and financing

From a financial perspective, the features that affect the attractiveness of the NetCo model to investors are the following.

- **Separation of business segments**—by separating the retail side of the business from the network management side, increased transparency is likely to ensue.⁷⁵ NetCo would aim to achieve a rate of return at least as high as the minimum required rate of return by investors (ie, the cost of capital).
- **Demand risk**—as outlined in earlier sections of this report, uncertainty of demand is one of the key risks of NGA investments.⁷⁶ Unlike revenues from copper-access networks, which are linked to the provision of tried-and-tested products, revenues for FTTx networks are linked to customers' willingness to pay for a relatively new product—ie, capacity that enables residential customers to consume 'bandwidth-hungry' content and a greater variety of high-speed business connectivity offerings.

Under the proposed separation scheme, service providers could pre-commit to steady cash flows to NetCo (hence allocating risk to downstream operators).⁷⁷ Under this mechanism, external investors earn the benefits associated with the creation of a utility-like entity with steady cash flows.

- **Scale of investment and construction risk**—the high fixed (upfront) costs associated with NGA roll-out, coupled with the significant uncertainty of construction CAPEX (due to the partial greenfield nature of NGA investments), may hinder financial investors' incentives to hold equity stakes throughout the whole construction phase.

While they would not be precluded from participating at the outset, it seems more likely that financial investors would be attracted to NetCo from year 5 onward when the construction and demand risk will be significantly reduced.

These characteristics inform the design of the financing scheme of NetCo, outlined below.

4.2.1 Features

While the financing scheme would be flexible to country-specific micro- and macroeconomic circumstances, the following features seem likely, if not necessary.

⁷⁵ See, for example, House of Commons Trade and Industry Committee (2005), 'Ofcom's Strategic Review of Telecommunications', April 5th, p. 12, para 31.

⁷⁶ The importance of demand risk in this type of co-investment is not limited to the telecoms sector. A discussion of how this type of risk affects co-investments in offshore wind transmission systems is contained in the Appendix.

⁷⁷ See section on 'Entry and exit'.

Feature 1: staggered entry of heterogeneous investors

Risk should be allocated among parties/stakeholders depending on their ability to assess and influence the outcome.⁷⁸ Consistent with this, at launch, NetCo would be expected to be principally funded by operator–participants, given their ability to encourage demand and control risk. Financial institutions would not be precluded but may be more likely to invest at subsequent stages, once the construction phase is complete. (Although, operator–participants would, of course, be expected to fund their equity participation in NetCo via a number of indirect financial instruments relevant to their individual financial position).

As risk reduces over time, the investment scheme would evolve gradually into a purely commercial activity, with the ownership of equity stakes no longer necessarily linked to presence in the retail sector.⁷⁹ Given the entry by purely financial investors (including pension funds) into NetCo’s capital structure, entitlements enabling purchases of NetCo’s output directly (see below) would necessarily have to be delinked from ownership stakes.⁸⁰

Feature 2: financial returns derived from upstream and downstream operations

NetCo participants would earn a share of NetCo’s returns (in the form of dividend) over and above the returns each of the operators generates in the downstream market. Hence, high market share at the retail level (or any market share at all) is not a critical prerequisite for investment in NetCo.⁸¹

Feature 3: evolving capital structure over time

The discussion above shows that the capital structure of NetCo—and hence its cost of capital—would change over the lifetime of the investment. This would optimise the risk–return profile of the investment and fully exploit the financing options available for the project—eg, by adjusting the level of reliance on fixed-income claims over time depending on changes in investors’ appetite for this type of instrument.

In particular, upon termination of the construction phase, it may be convenient for NetCo to increase the proportion of debt in its capital structure, exploiting the reduced cost of this type of fixed-income claim. Indeed, 10–15 years into the project implementation—upon termination of the construction phase—the riskiness of the cash flows may have reduced to a level where higher gearing ratios may reduce the financing costs without affecting NetCo’s risk of insolvency to any significant extent.⁸²

4.2.2 Concrete options for financing schemes

Having established the primary features of the financing model for the NGA network investment, it is possible to envisage a more detailed financing framework, although, at this

⁷⁸ Irwin, T., Klein, M., Perry, G.E. and Thobani, M. (eds) (1998), ‘Dealing with Public Risk in Public Infrastructure’, World Bank Latin American and Caribbean Studies: Washington, D.C.

⁷⁹ An example of this is the two-stage financing of the Nord Stream pipeline, a pipeline connecting Russia to Germany, which is expected to be operational by 2011/12. For this pipeline, more favourable financing terms obtained in the second round of financing pushed investors to seek renegotiation of the terms agreed during the first round. The investors explained that the ‘positive construction progress’ was reducing the overall risk of the project. Nord Stream AG (2011), ‘Nord Stream AG Seeks Amendment of Phase I Pricing Levels’, press release, September 13th.

⁸⁰ Another example is the two-stage financing of the Nabucco natural gas pipeline, a pipeline connecting Turkey to Austria, which is expected to be operational by 2017. For this pipeline, more favourable financing terms obtained in the second round of financing pushed investors to seek renegotiation of the terms agreed during the first round. The investors explained that the ‘positive construction progress’ was reducing the overall risk of the project. Nord Stream AG (2011), ‘Nord Stream AG Seeks Amendment of Phase I Pricing Levels’, press release, September 13th.

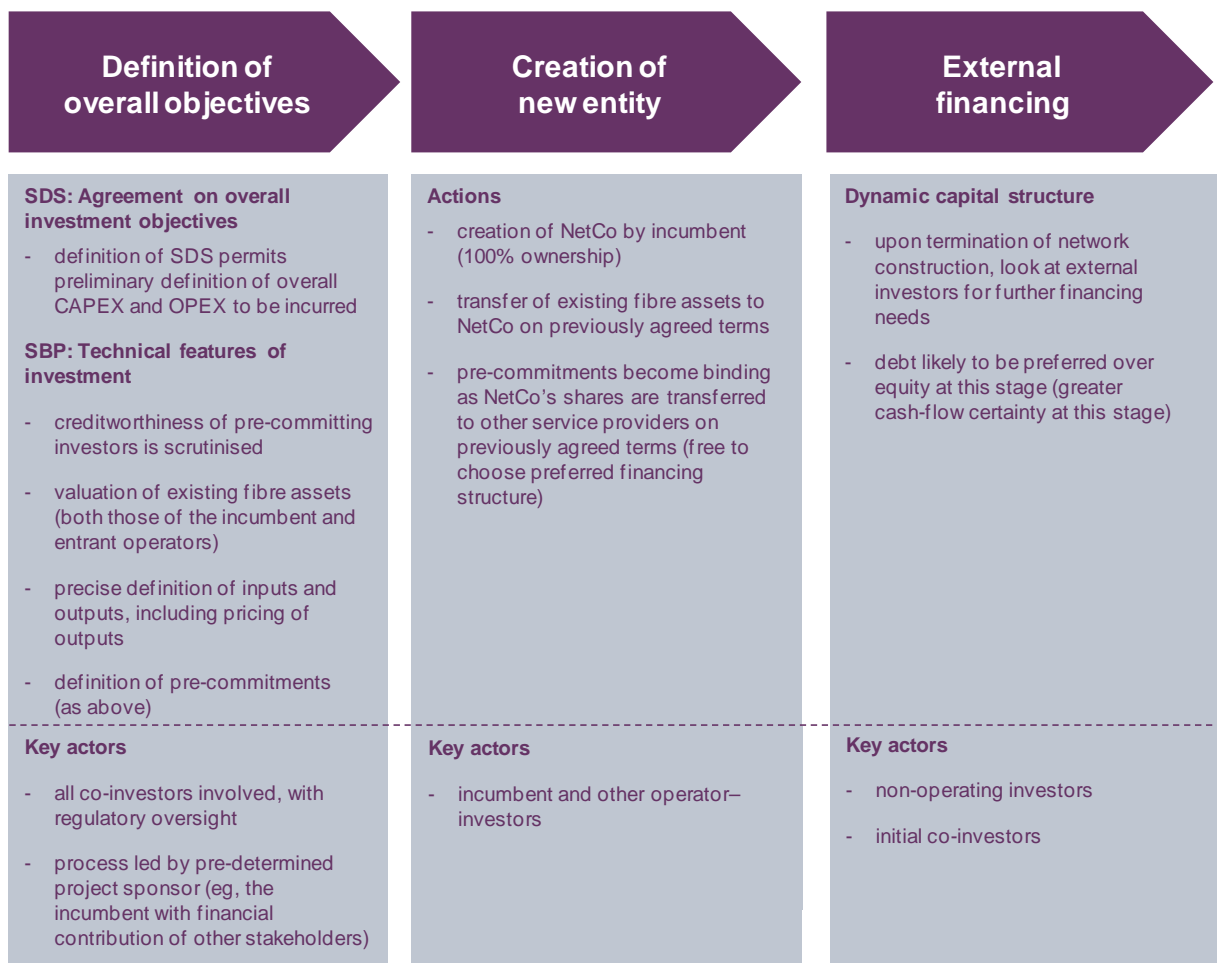
⁸¹ The possibility of regarding this type of co-investment as purely a financial investment is demonstrated by the Atlantic Wind Connection case study. As can be clearly inferred from statements released by one of the co-investors in that joint venture (Google), the possibility of earning solid financial returns may represent a sufficiently strong incentive to invest in the industry, even in the lack of active direct participation in the market. See the Appendix for further details.

⁸² Alternatively, if NetCo participants are willing to provide guarantees on NetCo’s debt (most likely separately but not jointly) it may be efficient to run a higher level of debt gearing within NetCo, even during the initial phase. In the context of pipeline development projects, a 70–30 debt–equity split appears to be rather common. See, for example, Nabucco Gas Pipeline, ‘Facts & Figures’, available at: http://www.nabucco-pipeline.com/portal/page/portal/en/press/Facts%20_Figures; and Nord Stream (2011), ‘Nord Stream Secures Phase II Funding’, March 4th, available at: <https://e-facts.nord-stream.com/app/article/index.cfm?fuseaction=OpenArticle&aoid=2914&lang=EN>.

stage, it is not necessary (nor possible) to assess the specific financing arrangements that would be adopted in later stages.

Figure 4.3 depicts the high-level building blocks of the potential financing framework.

Figure 4.3 Stylised illustration of the financing scheme for NetCo



Source: Oxera.

In setting out the steps to be taken, a balance is needed in order to agree a baseline financing timescale with a flexible structure which is open to some rebalancing of interests on the part of participating investors. With respect to these objectives, the proposed financing scheme would have some specific characteristics, as follows.

- **Commercial negotiations underpinning the transfer of existing infrastructure assets from the incumbent and other participants to NetCo.** The sale of NetCo's shares to service providers may involve the payment of a share premium over the net book value (NBV) of the assets.⁸³ This premium can be regarded as an instrument for service providers to compensate the incumbent and other 'early movers' for participating in the scheme and contributing their already existing fibre networks to NetCo. The valuation of these pre-existing assets or the principles for determining their value would likely need to be set by NetCo prior to its receiving any funding commitments.

⁸³ An example of where this kind of premium has been paid under similar circumstances is the sale by 4Gas of DragonLNG's shares. DragonLNG operates an import, storage and regasification terminal in Waterston, Milford Haven, Wales, completed in August 2009. See Euronext (2004), 'Petroplus and partners in Dragon LNG sign agreements to trigger go-ahead for Milford Haven importation terminal', press release, December 1st. Available at: <http://www.euronext.com/news/companypressrelease/companypressrelease-1721-EN.html?docid=89678>.

- **Protection of minority stakeholders through default rules.** Since all existing infrastructure would be secured into a separate legal entity (a separate company), minority shareholders would gain the benefit of the automatic protection of minority stakeholders that characterises most EU jurisdictions (through the automatic application of default rules to any shareholders' agreement).⁸⁴
- **Financing flexibility.** When purchasing stakes in NetCo, service providers would have the possibility of optimising the financing structure behind their individual stake.

Having set out the overall financing scheme for NetCo, it is important to recognise how this initial design can be refined to account for further needs that may arise throughout the pre-development phase. For instance, additional flexibility in the pre-commitment auction could be achieved by inserting termination options or capacity-adjustment options in the initial pre-commitment agreement, following the example of some large-scale pipeline projects.⁸⁵ The mechanism through which the ownership and capacity of NetCo is distributed is discussed in further detail below.

It is recognised that the Commission has introduced alternative financing schemes to boost fibre investment, namely the 'Connecting Europe' facility, the main features of which are summarised in Box 4.3.

Box 4.3 The European Commission's 'Connecting Europe' Facility

One of the objectives of the European Union in trying to achieve the targets set out in the Digital Agenda is that of enacting measures that can help 'de-risk investment' and create an environment that is more conducive to private infrastructure investments.¹

To this end, the European Commission has recently announced its intention to set up a 'Connecting Europe' Facility—ie, a financing scheme that may help optimize the risk/return profile of investments in digital networks.² While the precise details of the scheme have not been released yet, it is likely that this facility will be modelled upon the EIB's Risk Sharing Finance Facility, given the success of this scheme.³

The Connecting Europe Facility is meant to address the current need for 'reasonably priced risk-enhancing instruments at project level which in turn could be catalyst for attracting additional private financing'.⁴ Under the RSFF model, the Connecting Europe Facility would provide funds to investors by issuing two tranches of notes: low-risk senior notes (offered to the general public) and subordinated notes (retained by the EC/EIB).⁵

The Commission has recently proposed to allocate €9.2 billion for pan-European projects to develop high-speed broadband network, the funding taking the form of equity, debt or grants (it appears that grants would be aimed primarily at trans-European projects) and at least €7 billion will be reserved for investments in high-speed broadband infrastructure. The Commission considers that this allocation should leverage a total investment of €50 to €100 billion.⁶

Notes: ¹ European Information Society (2011), 'How to Achieve the 2020 European Digital Targets', July, p. 2. ² European Commission (2011), 'A Budget for Europe 2020 - Part II: Policy fiches', June 29th, p. 55. ³ European Information Society (2011), 'NGA Working Group 3: 6 Common Measures', July 13th, p. 8. ⁴ Ibid. ⁵ EIB, 'How RSFF Works'. Available at: <http://www.eib.org/products/loans/special/rsff/how-rsff-works/index.htm>. ⁶ European Commission (2011), 'Digital Agenda: Commission proposes over €9 billion for broadband investment MEMO/11/709, October 19th.

⁸⁴ Forms of protection of minority shareholders include: high quorum or supermajority voting rules with regard to corporate actions likely to harm minority shareholders; fiduciary duties imposed on majority shareholders; appraisal rights allowing a minority shareholder to exit with full compensation; or indeed a requirement of approval from a public authority. For further discussion, see Armour, J., Deakin, S., Lele, P. and Siems, M. (2009), 'How do Legal Rules Evolve? Evidence From a Cross-Country Comparison of Shareholder, Creditor and Worker Protection', *American Journal of Comparative Law*, 57:3, pp. 579–629.

⁸⁵ See Mackenzie Gas Project (2004), 'Application to the National Energy Board for Approval of the Mackenzie Valley Pipeline', 2, August, section 2, available at: http://www.mackenziegasproject.com/theProject/regulatoryProcess/applicationSubmission/Documents/MGP_CPCN_Vol2_Sect_2_S.pdf.

The advantage of this type of structure would be that, in the absence of general appetite for risk, the offer of the EIB to take up the extra risk that exceeds the desirable threshold may ease potential credit constraints faced by NetCo.

4.2.3 Taxation

So far, the taxation implications of different forms of financing or locking in participants to fund NetCo have not been taken into account. The taxation implications of creating NetCo are likely to vary by both the country within which it would operate and potentially the financial position of the participants. The NetCo solution within each country would need to be designed with these taxation implications in mind, while still creating a NetCo structure that has the necessary characteristics as set out in this report.

4.3 Entry and exit

Fundamentally, the NetCo model implies that operators share the upfront CAPEX and commit to a certain share of NGA-related OPEX. There are two underlying economic characteristics that should be met in NetCo's design.

- First, a scheme that encourages early commitment is desirable, given the objective of a large upfront investment and the underlying demand risks (see discussion in section 2). The model should encourage participating operators to acquire a stake that reflects their valuation of NetCo. Put another way, the model should ensure incentives for participants to commit to a sufficient level of funding to meet the overall objectives set out in the SDS and SBP.
- Second, the system must allow for the fact that different participants in NetCo will wish to use NetCo's services in amounts that will vary through time (particularly as NetCo rolls out its network footprint) and as participants are more or less successful in the retail market (ie, the market in which they compete, and for which NetCo's output is an input). Whatever initial stake is taken, a participant's presence in the retail market will not necessarily be aligned or may vary.

This sub-section presents concrete options for how the participation scheme could be introduced in a way that provides incentives for early participation, yet allows for dynamic market entry and exit in later years (in terms of ownership of NetCo), and allows for effective competition in the downstream market. The following economic factors need to be considered in the design of conditions for entry and exit.

- The design needs to be consistent with the objective to ensure that the operator–investors must be sufficiently committed and have a sound financial standing.⁸⁶ As noted previously, it will be important that the resulting agreements are accepted and considered as legitimate by all stakeholders—by both participants investing in NetCo now, and those waiting to enter at a later stage.
- The incentives of potential participants may not be symmetric in terms of strategies in the downstream markets and existing network footprint. For example, incumbents have traditionally targeted a broader range of customers and have (for historical reasons and because of their universal service status) wider backhaul network coverage than entrants. However, the incentives could be aligned, as the creation of an upstream revenue-generating entity could create an incentive to target the financial returns of NetCo in addition to returns from retail activities. Put another way, entrants targeting

⁸⁶ For instance, shipments through the Gassled pipeline system are restricted to companies that have a rating of triple B or higher or that are capable of providing a guarantee equal to 24 months' tariff payment for the booked capacity (from a parent company rated triple B or higher or from a banking institution). See Brautaset, A.L. (2004), 'The New Framework for Gas Transportation in Norway' in Roggenkamp, M.M. and Hammer, U. (eds), *European Energy Law Report*, 1, p. 18.

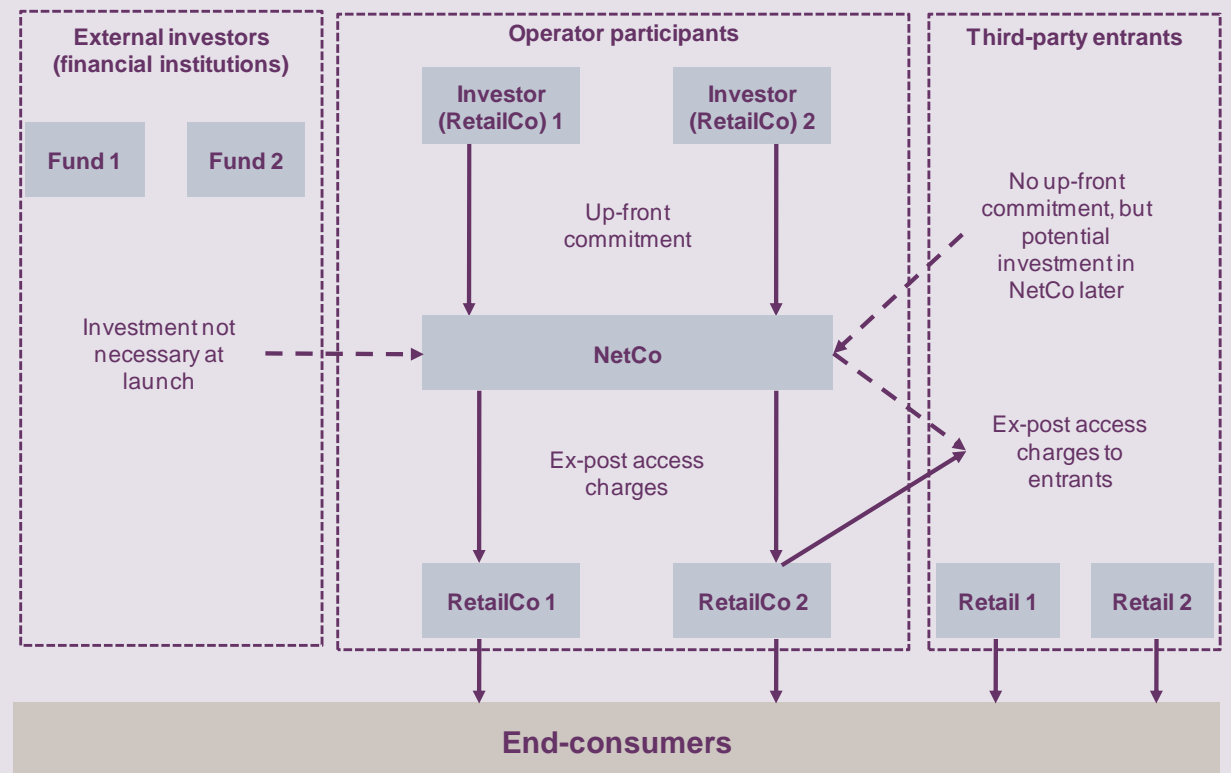
niche areas (or indeed investors without activities in the retail market) may find it profitable to invest in NetCo, given that they are entitled to a share of revenues generated outside the areas where they (will) have customers.

- The framework should be consistent with the regulatory objective of dynamic competition, particularly in those markets for which the output of NetCo is a (wholesale) input. In addition, there should be pre-specified rules for late entry and exit for participation in the ownership of NetCo.
- The funding objective of attracting outside (institutional) investment at a later stage may place additional constraints on the conditions attaching to ownership. To the extent that investors may prefer risk to be transferred downstream, long term contracts resulting in steady cash flows to the investor may be desirable, albeit not a critical feature of the model.

Box 4.4 below provides a summary of the envisaged structure of the entry to, and exit from, the NetCo model and associated cash flows and risk transfers. Specific features are presented further below.

Box 4.4 Summary of pre-commitment and cash flows over time

The figure below describes a stylised representation of the cash flows and risk transfers within the NetCo model.



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

The key characteristics of the NetCo scheme over time are as follows.

- Insofar as the demand for initial participation in NetCo is sufficient, the ownership stake does not need to be linked with the retail market share.
- Operator participants commit to 10 years' participation through a trough and auction process where the minimum stake is 10% and maximum 80%, with at least three participants. The investment in NetCo implies that they have access to NetCo's services. There is a steady cash outflow from participants to NetCo to fund the required CAPEX and OPEX according to the CAPEX profile set out in the SBP in terms of 'homes passed'.
- Wholesale charges (ie, access to fibre network) would be designed to recover fixed and variable costs based on demand projection at the time of investment, and generate a return equal to NetCo's ex ante cost of capital.
- NetCo pays dividends to its owners in proportion to ownership stakes.
- Third-party active access would be provided by participant operators on commercial terms.
- Third-party passive access is based on commercial terms and would not be subject to ex ante regulatory intervention.

NetCo would not sell access services to third parties on prices and terms that are preferential compared to the terms received by its owners.

- External investors would be likely to enter after the construction risk is over although their earlier participation would not be restricted. They would either purchase stakes from operators, or fund additional investments where additional network upgrades are considered worthwhile (subject to the views of the NetCo Board and the NGICC).

Feature 1: initial stakes in NetCo are allocated through an auction process, with a minimum ownership of 10%, and maximum of 80%, and a commitment to fund NetCo for a ten-year period

While in principle the ownership stakes could be determined through commercial bargaining, it would seem more transparent for a broad range of potential investors to allocate ownership stakes through an auction process, subject to an objective vetting process by NetCo. Ownership of NetCo would give a participant an entitlement to use NetCo's access network.

The auction would be open to any participants willing to commit to at least 10% ownership. The bidders would need to demonstrate their financial viability; a potential approach to define this would be to set a minimum credit rating. Setting a minimum investment requirement would be consistent with the above-described objective to ensure a sufficient level of participation, while ensuring sufficiently competitive market structure and allowing asymmetry across participating operators. It is noted that such minimum stakes are not present in some other co-investment projects (eg, pipelines, certain technology R&D joint ventures). However, rigorous pre-determined criteria have been applied widely in other network sectors, where companies have to fulfil certain conditions to obtain licences, and (for example, with respect to quality requirements for water companies and rail franchises) have to demonstrate a credible business plan meeting pre-defined standards.

It would seem reasonable to auction the shares through a simultaneous auction, as follows.

- Through a bidding process where the minimum stake is 10%, operator-participants commit to ten years' funding of CAPEX and any start-up operational losses. The investment entitles them to be able to purchase any level of NetCo's output. There is a steady cash outflow from participants to NetCo to fund the required CAPEX and OPEX (according to the CAPEX and OPEX profile set out in the SBP). Insofar as expected returns from NetCo are sufficient to incentivise enough bids when stakes are first auctioned, the ownership stake is not linked to the maximum share of NetCo output that the shareholder can purchase.
- If potential investors bid for more than 100% of NetCo, bids are scaled down proportionally, subject to maintaining the minimum share at 10%, if possible. If bids do not reach 100%, a new bidding round is instigated with access to NetCo's output (eg, fibre loops/total households connected) restricted to, say, twice the share of the equity owned.⁸⁷ This refinement is designed to create an incentive for participants to take on an ownership share that is proportional to their overall usage of NetCo's output.
- Participants could use their existing assets in their bids, insofar as these assets are used by NetCo. This would require a prior valuation on the basis of pre-determined asset valuation principles (see discussion below on 'transition').
- The maximum ownership would be 80%, and the minimum number of operator-participants would be three. This would render a relatively fragmented market structure and would be expected to result in wholesaling of active access to independent third parties. By way of an example, in mobile markets, where there are often three or four network operators, third-party access has occurred on commercial terms.

The private valuation for the network is dependent on the proceeding terms and conditions, both with respect to the commercial contracting (including the NGICC) and the regulatory

⁸⁷ An approach consistent with this has been employed by the gas transportation sector in Norway, where capacity allocation was limited to twice the owner's equity interests. See Brautaset, A.L. (2004), 'The New Framework for Gas Transportation in Norway' in Roggenkamp, M.M. and Hammer, U. (eds), *European Energy Law Report*, 1, p. 21.

framework. The above-described ten-year commitment would apply for all successful bidders, regardless of the ownership stake.⁸⁸

Feature 2 sets out principles for cash flows to and from NetCo.

Feature 2: participants' cash outflows to NetCo would consist of pre-committed funding of NetCo's costs and wholesale payments; cash inflows (dividend) from NetCo would be proportional to ownership

A participation scheme that aligns the incentives of participants, allocates unrealised or oversubscribed demand and caters to late entrants could be complex to implement. In principle a commitment mechanism should aim for the minimum complexity. Indeed, while the 'ex ante cost sharing' has been considered a relatively simple form of risk sharing,⁸⁹ there are potential complexities associated with schemes where ownership stakes are linked with capacity utilisation, which could be better suited to, for example, sharing of transmission capacity rather than sharing of access connections.

There are two types of cash outflows from participant operators to NetCo: investments (share purchases) and wholesale payments, as follows:

- **Investments would be proportional to ownership.** Following the process defined in section 3, NetCo participants would agree on the NGA deployment scope and decide on upfront CAPEX commitment and the associated OPEX (although OPEX is unknown and depends on the extent to which downstream demand materialises). The capital injections to fund NetCo's NGA roll-out would be proportional to participants' ownership stakes.
- **Wholesale payments would depend on usage.** As set out above, NetCo participants would pay for the use of NetCo's products (predominantly unlit fibre) in addition to the investments they commit to at launch. By being an investor, participants gain the ability to buy from NetCo, and is not a pre commitment to actually (pre) purchasing any particular amount. Rather, wholesale prices would be paid for each of the 'homes connected'. Further, NetCo would operate as a profit-maximising entity and would be free to determine its prices as it finds optimal; however, NetCo's pricing would be designed to generate returns that are commensurate with the risk at the time of investment and hence equal to the (ex ante) cost of capital (subject to the 'safety cap' described below).

It may well be that NetCo chooses to offer volume discounts for 'pre-committed capacity.' As explained below (section on 'Pricing'), the only restriction on NetCo would be that it is not allowed to price-discriminate between participating investors nor sell to non-investors at a price below that which it sets for investors.

In practice, the wholesale payments would be reflective of CAPEX and the variable components, such as installation and maintenance, should be reflective of NetCo's marginal costs of connecting and maintaining subscriber lines. While the fixed costs (both CAPEX and OPEX) would depend on the network coverage in terms of 'homes passed' and would hence be estimated with some accuracy ex ante in the SBP, the variable component would depend on the amount of 'homes connected'. Participants would thus pay wholesale charges for each 'home connected' in addition to the pre-committed investment, which in turn would be proportional to equity stake. Wholesale charges (ie, access to fibre network) would be designed to recover fixed and variable costs based on demand projection at the time of investment, and generate a return equal to NetCo's ex ante cost of capital. As such the

⁸⁸ This is consistent with the approach taken by National Grid when auctioning network capacity: a large proportion of the capacity (approximately 80%) is offered in long-term auctions (2–16 years) as opposed to short-term auctions. See discussion in the 'Entry and exit' section of the Appendix.

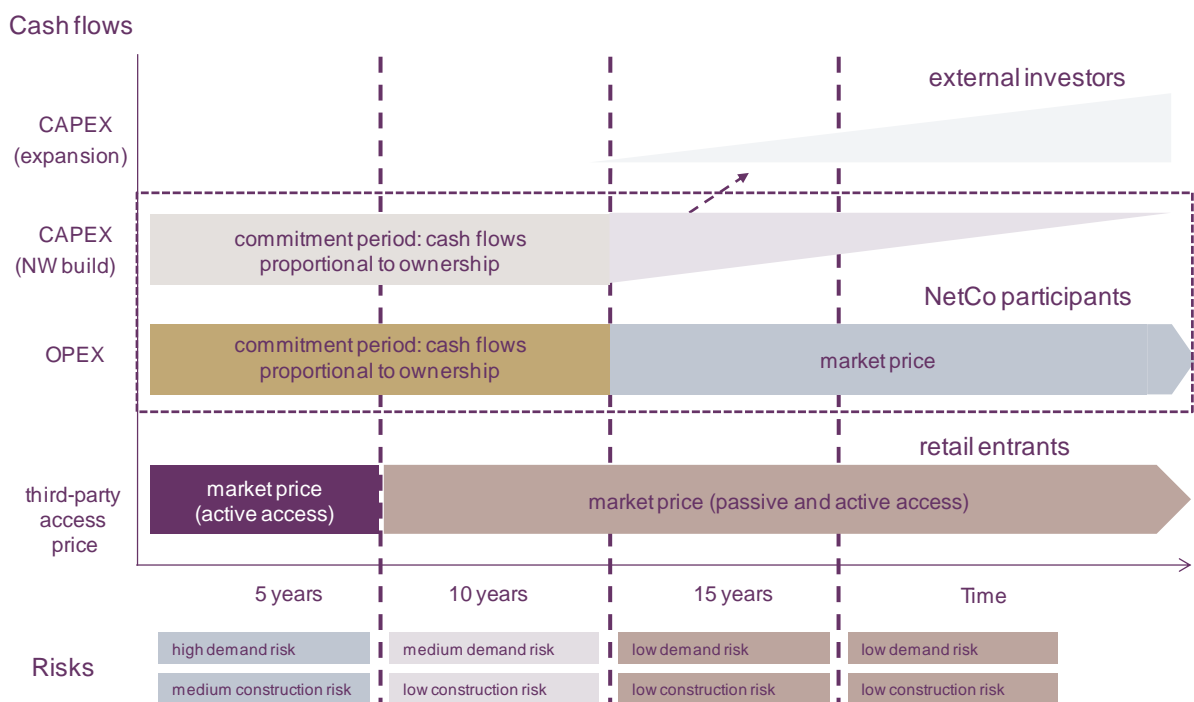
⁸⁹ The conceptual groundings of pre-commitment schemes are discussed in Nitsche, R. and Wiethaus, L. (2010), 'NGA: Access Regulation, Investment, and Welfare A Model Based Comparative Analysis', ESMT White Paper.

pricing scheme would be similar to the internal prices paid between retail and wholesale arms of certain incumbents (eg, BT/Openreach). There are two sources of income (cash inflows) for participants:

- Dividends from NetCo would be distributed to participants proportionally to their ownership stake.⁹⁰
- All NetCo participants would earn additional retail margins on the services they sell which incorporate NetCo inputs. As noted above, downstream market shares would not be tied with ownership stake, a feature that has been put forward in some propositions for risk-sharing arrangements.⁹¹ Such an ex ante definition of retail market shares could be problematic in terms of the regulatory objective to promote competition and the general competition law.

NetCo's cost recovery (in terms of CAPEX and OPEX), and entry and exit options over time are illustrated in Figure 4.4.

Figure 4.4 Pre-commitment and cash flows over time



Source: Oxera.

Finally, the precise design of the cost-sharing scheme and 'internal' wholesale pricing could depend on country-specific circumstances and, for example, taxation. If a substantial part of the costs of NetCo are covered by share purchase rather than purchase of services, this will not be tax-deductible. Indeed, entities will pay tax on the dividends that flow back to them. Considerations such as this may influence the specifics of the scheme.

Feature 3: participation stakes could be traded on a purely commercial basis

New entrants could enter the market via the purchase of a stake from an existing owner or NetCo could decide to sell its passive products directly to non-owners in a pure wholesale market, after the first five years, however. Specific characteristics of this feature are:

⁹⁰ Decoupling financial returns on equity stakes from usage of the network can lead to lower incentives for operators to hold stakes in the upstream market, as seems to have been the case in the Gassled case study (see the Appendix).

⁹¹ Krancke, J., 'Reviewing the regulatory environment for NGA investment', Telecoms Regulation and Competition Law, October.

- the NetCo Board would decide (on the basis of pre-defined criteria) whether the purchaser meets the minimum requirements to become a NetCo participant;
- if the upside occurs, the optimum market price for a stake in NetCo (or simply to purchase its passive products) will be higher—ie, there is a premium for sharing risk at the time of the investment. Following the logic set out in Feature 2, this is returned to owner/users in the form of dividends from NetCo to owners, in proportion to the ownership shares. This dynamic would require commitment by the regulator, which would not intervene in the sale of NetCo stakes, nor require access to NetCo’s output for non-participants.

If NetCo chooses to sell its passive products directly to non-owners, it may not do so at a price below which it supplies its existing owners. In a downside scenario, this would not prevent it from lowering the price it charges both owners and non-owners if the NetCo Board determines that this is the profit-maximising strategy. This is necessary to incentivise early investment (and minimise losses in the downside scenario) where otherwise, very low access pricing may be profit-maximising for NetCo, but highly detrimental to its investors.

It would seem advisable to determine criteria for purchasers of NetCo stakes in the secondary market (eg, credit rating).

Feature 4: entry is possible on the basis of commercial negotiated purchase of bitstream access or virtual unbundling—ie, for participants to sell their own ‘wholesale’ services

New third-party entrants could also enter the market via wholesale purchases of capacity (in practice, this would be implemented through a commercial bitstream or virtual unbundling access market). During the first five years, NetCo would not sell passive access products to entrants in the wholesale market. Entry would thus only occur through active access products provided by participating operators.

A comparison can be drawn with the access to mobile networks, where mobile virtual network operators (MVNOs) negotiate access terms for radio network capacity on a commercial basis. This could further address the demand uncertainty, to the extent that there are indeed independent providers which could fill the excess capacity gap. Similar to MVNO models in the mobile sector, this could result from these alternative providers having access to distribution channels that are not available to incumbent operators (eg, large supermarket chains).

It is recognised that some of the currently active smaller operators not participating in NetCo and targeting niche customer groups may require regulatory assurance to ensure continuation of their current services. In the event that no NetCo participant would find it commercially viable to provide wholesale access, the end-users served by these operators could, in principle, be at risk of losing connectivity. Given the regulatory duty to protect consumers, a safeguard mechanism could be introduced: the operator that had provided wholesale access before NetCo (most likely the incumbent) would remain as a provider of last resort, if commercial agreements could not be established. It is, however, noted that it seems unlikely that participating operators would not have incentives to provide active access to a third-party wholesale customer that already has an existing customer base generating revenues. In this market—the provision of bitstream type services—there will be multiple potential suppliers (ie, all the participants in NetCo).

Subject to acting in the interests of NetCo as a whole (see section on ‘governance’) NetCo could decide to open out its service offering to non-participants after the five-year period. This is likely to be rational only after the demand uncertainty and high CAPEX phase of the investment is over. It is also likely to be when external investors would be interested in taking a purely financial stake in NetCo (see above). The commercially derived passive access prices are expected to, at least, enable recovery of relevant incremental costs, and a

contribution to fixed, and possibly common, costs plus a mark-up corresponding with the cost of capital.

Feature 5: entry of new investors would be subject to viability of business model and merger control

At the end of the commitment period (ten years) the ownership requirement to fund additional CAPEX could be removed. NetCo participants would be allowed to divest their stake to external parties. This could involve non-participants, whether other operators or financial institutions. If NetCo has decided to sell its output to non-participants, a NetCo participant could also choose to sell its stake, but remain in the downstream market. By exiting the downstream market it would also be possible for a NetCo participant to divest its capital share to an outside investor, partly or entirely. Divestments of NetCo's shares would be subject to three types of conditions:

- SBP would define pre-conditions for existing and new NetCo participants. This includes commitments to network roll-out and topology, and compliance with the NGICC. As at the time of launch, any new operator-participants would need to demonstrate their ability to fund the proposed CAPEX and OPEX obligations;
- divestments of equity participation would be subject to standard competition law and merger control. Specifically, if the merger control notification thresholds are met (eg, as embedded in the EU competition law),⁹² either national competition authorities or—when the divestments and potential concentration have a Community dimension—the European Commission would investigate any implications for competition in the market, and remedy the transactions accordingly.
- the regulator (the NRA and/or the Commission) would monitor changes in shareholding to ensure that they are consistent with original commitments on which the regulatory approach is based.

External investors are depicted in the figure in Box 4.4 above. At an appropriate stage of network maturity, additional capital could be sought for ongoing CAPEX (expansions or upgrades, subject to approval by NGICC) or simply to permit divestment by a NetCo participant.

As illustrated above, once the demand and construction risk have sufficiently diminished (ten years), and the steady NetCo cash flows are available to fund expansion or upgrade CAPEX, investing in NetCo by purely financial investors is likely to become more attractive. In order to make the model attractive to financial institutions, a mechanism through which NetCo would earn steady cash flow could be considered (see below).

4.4 Wholesale pricing flexibility

There are economic reasons why pricing flexibility would be essential in the context of NGA wholesale products. Notably:

- **willingness to pay unknown.** Both the shape and position of the demand curve for super-fast broadband is, to some extent, unknown at the time the network is built. As the variety of services that can be offered over the fibre network increases, there will be greater differences between consumers' willingness to pay for the underlying connection: some have low willingness to pay and want basic 'legacy-level' services only; some early adopters have high valuation for advanced bandwidth-hungry services. NetCo, as the upstream firm with market power, can maximise the output and revenue by price-discriminating in terms of how it recovers the sunk and fixed costs which are

⁹² European Commission (2010), 'EU Competition Law Rules Applicable to Merger Control', April.

- common to all users (ie, not dependent on the speed of the service actually provided over the fibre);
- **critical mass required.** Given the demand uncertainty and network effects exhibited by services and applications, service providers (and hence NetCo) may find it profit maximising to charge below-cost prices at an early stage of market development in order to achieve sufficient penetration—ie, critical mass;
 - **geographical cost differences.** Further to the underlying demand conditions, there are salient differences in network costs across different geographic areas (in terms of economies of scale and density). While there may be societal benefits in ensuring certain level of basic USO service, the revenue-maximising pricing structure takes into account geographic cost differences. This is of particular relevance in areas where NetCo competes against cable operators which operate mainly in selected densely populated regions;
 - **pricing to give appropriate reward for ex ante commitment.** Given the underlying demand uncertainty, early commitment should be appropriately rewarded. In the event that a maximum allowed return is set ex ante this would either need to be symmetrical (ie, limits on the upside scenario should be accompanied with support mechanisms in the downside scenario) or, more likely, regulators would retain the ability to intervene only if NetCo were to earn returns that could be considered excessive in the long term and such thresholds were clearly set ex ante.

While there are country-specific differences in the way price controls are implemented, in general the pricing flexibility allowed currently does not seem to allow a sufficient degree of price discrimination to fully address the issues set out above. Furthermore, where a degree of flexibility is allowed (eg, the UK), the regulators may change their approaches.

4.4.1 Features

Given the issues set out above, it would seem advisable that NetCo should be allowed (by the regulator) to reflect demand and cost conditions in its pricing. In particular, pricing flexibility should not be limited to the next regulatory period, but over a long time horizon (see discussion on commitment above). From the regulator’s perspective, such long-term flexibility should be acceptable, given the fundamentally more competitive industry structure that NetCo induces, and the NGICC mechanism which would ensure that the pricing flexibility of NetCo does not distort competition in the downstream (retail) market(s).

For the sake of clarity, it is noted that NetCo would charge explicit wholesale prices for its services. Thus, over and above the cash outflow associated with pre-commitment, service operators pay NetCo for each service they use in the provision of their own retail services.

NetCo’s pricing would follow the same principles for both active and point-to-point access products.

Feature 1: two-tier/multi-tier pricing

To enable copper to be retired completely within NetCo’s footprint, while minimising the price increase for those who do not wish to take up very high-speed services, the NetCo solution should enable the transfer/wholesale price of a dark fibre connection for at least ‘telephony only’ to be less than ‘high-speed’ service (notwithstanding the fact that the facility that NetCo provides as an input to the service providers is the same). In addition, there should be no regulatory restriction on NetCo also ‘tiering’ the price of its output within the high-speed category of use based on the speed provided, as long as this does not distort competition in the downstream markets.

In practice, where passive point-to-point inputs are provided, NetCo would be allowed to provide (at least) three tiers of access prices even though the service provided by NetCo is the same (ie, unique access to a particular fibre):

- USO basic services;
- standard broadband (comparable to current generation);
- super-fast (NGA) services.

It would be necessary for NetCo to monitor the bandwidth of service being delivered by an operator over a particular line and adjust the wholesale price on that basis. In practice, there would be a rule for the participants to ‘self-declare’ what speed of service is provided over a given fibre connection and, critically, NetCo would have the right to (commission an independent) audit to review and confirm this retrospectively.

It should also be available to NetCo to price-discriminate within the broadband category based on speed, as long as competition in the downstream (retail) market is not distorted.

Where active bitstream or virtual unbundling is provided (ie, where GPON topology is deployed), NetCo would be allowed to differentiate the wholesale product in terms of bandwidth in a way that it considers most efficient, again, subject to the requirement not to distort competition in the downstream market(s). A tiered pricing structure has been introduced, for example, in Australia, where NBN Co is a structurally separated entity, similar to NetCo.⁹³

Feature 2: geographically differentiated pricing

To enable the maximum geographic roll-out, while at the same time avoiding the threat of overbuild, geographic averaging of prices should not be required, but it might be chosen to ease migration from currently averaged copper prices. To enable pure economies of scale to be used to extend the NetCo coverage, any price above long-run marginal cost should be permissible. Specifically:

- depending on country-specific conditions, a 2–4 geographic (geo-type) tier pricing model could be envisaged;
- geographic tiers would be defined in terms of number of achievable end-users for a given point of interconnection/exchange (consistent with the principles outlined by Ofcom and ERG (now BEREC), for example).

There are significant benefits in allowing geographical price differentiation: further to demand conditions (end-users’ willingness to pay for high-speed broadband may vary across regions), there are salient supply-side factors that set constraints for wholesale prices. Notably, differences in economies of density and resulting networks costs, and the presence of competing cable networks in certain areas are likely to be factors that drive NetCo’s pricing strategies.

Feature 3: participants could determine their own ‘wholesale’ prices independently

There would be no restrictions on participants’ unilateral wholesaling of bitstream access where the output of NetCo is an input to that (wholesale) service (subject to taking the appropriate price from NetCo). In other words, participants could launch active access products on a unilateral commercial basis. Exhibiting some similarities with the MVNO access market in the mobile markets, multiple providers of wholesale access could ensure the functioning of the ladder of investment as non-participants could build market share based on bitstream access, later migrating to virtual unbundling and potentially purchasing an ownership stake in NetCo.

While unlikely, given the oligopolistic market structure, should any single operator possess SMP with respect to this type of wholesale broadband access, the regulatory framework would apply in the same way it does currently.

⁹³ In Australia, NBN’s pricing of the entry-level product tiers is designed to facilitate the migration from legacy platforms. NBN Co (2010), ‘Wholesale Access Service Product and Pricing Overview for Access Seekers’, December.

Feature 4: NetCo could have asymmetric pricing for participants and third-party entrants

As noted above, NetCo's objective is to secure an appropriate return for investors. NetCo would be free (but not under any obligation) to sell additional dark fibre capacity to non-investors (ie, those who had not pre-committed to fund NetCo) after the first five years. In setting such prices, NetCo would *not* be required to charge these customers the same as it charges investors.

NetCo would not be permitted to offer such non-investors lower prices than it sells to investors, but it would have the flexibility to lower prices to both. If demand were higher, it may be that the price to non-investors would be higher. This would represent one of the incentives for those wanting to use NetCo's services to be investors and pre-commit to funding the CAPEX and OPEX of NetCo.

Feature 5: any wholesale pricing structure agreed by NetCo that meets the requirements imposed on NetCo shall not subsequently be challengeable under telecommunications regulation over the period agreed

This requirement follows from the commitment to regulatory stability. Unless it exists, there can be no guarantee that conditions under which investors commit (sunk) investments in NetCo are maintained during the phase when those investors would expect that they would earn a return on that investment.

As articulated below in section 4.7 ('Regulation') NetCo's pricing would be designed so that it enables cost recovery and a return on investment commensurate with the risk to investors at the time of investment. Should NetCo's returns substantially and persistently exceed its cost of capital (a so-called 'safety cap'), intervention could take place to reduce returns. This practice may not, in effect, differ from competition law requirements; an intervention is warranted if an undertaking with a dominant position charges prices that are 'excessive', manifested through super-normal profits in the long term, but defines more clearly than competition law can and ex ante, the level at which returns would be judged excessive in this particular case.⁹⁴

4.5 Transition

Participation of incumbent operators would be essential to the functioning of NetCo. Consequently, it is important to manage incumbents' incentives appropriately throughout the whole transition phase (ie, the portion of the development phase terminating with the completion of the fibre cable roll-out). This transitory phase would mainly involve the management of four types of assets, as follows.

- **Existing dark fibre assets.** Prior deployment of fibre cable connections by incumbent operators means that NetCo's investors would need to devise some form of scheme that could help entice the incumbent and encourage this operator to participate in the NetCo scheme and to transfer these assets to NetCo.
- **New dark fibre assets.** Following the inception of NetCo, new dark fibre connections would be created, according to the principles set out in section 4.6 ('topology').
- **Stranding copper assets.** The ultimate objective of the NetCo model is that of expanding the reach of fibre cable connections. If implemented, this would be likely to open up a whole range of possibilities for the enhancement of broadband services over this network. In a scenario where demand migrates from copper networks to fibre

⁹⁴ While there is limited case law on excessive pricing at the EU level, there are various examples in the UK of excess profitability being considered a reason for intervention by the Competition Commission. Oxera's report to Ofcom in the context of BSkyB's profitability provides a comprehensive overview of the interpretation of the profitability gap—ie, the wedge between expected returns and the returns generated in the 'upside' scenario. Ofcom (2010), 'Assessment of Sky's profitability and cost of capital Annex 3 to Pay TV – Statement', March 31st.

networks, a reduction in the useful economic life of the incumbent's existing copper assets is likely. Appropriate remuneration for the reduced economic life of these assets is therefore crucial to ensure sustained interest in NetCo on the part of incumbents.

- **Partially stranding copper assets.** Depending on the agreed topology for the network, re-use of copper-cable ducts (and other passive infrastructure) may be possible and/or essential to minimising the cost of NetCo's network. In these instances, stranding of existing copper assets would be partially mitigated by the additional utility that could be obtained by the re-use of existing passive infrastructure.

In light of the typology described above, valuation of the incumbent's pre-existing assets is likely to generate some degree of controversy, due to the heterogeneous nature of existing assets (copper versus dark fibre) and the uncertainty of valuation exercises, which could be largely affected by bargaining considerations.

Stranding copper assets

When implementing the investment scheme, it would be crucial for NetCo (in practice, the non-incumbent investors in NetCo) to reward the incumbent for agreeing to participate in a project that could ultimately hasten the obsolescence of its existing copper assets.⁹⁵

However, some of these copper assets would be likely to become obsolete even in the absence of this new investment scheme (eg, due to cable competition). Indeed, in a counterfactual scenario in which the proposed model is not taken forward, stranding of the copper assets would still be likely to occur, only at a slower pace. Compensation for stranding copper assets should therefore be limited to the incremental losses incurred by the incumbent due to wider fibre roll-out and additional losses linked to the acceleration of the stranding process.

Pre-existing fibre assets

Under the proposed scheme,⁹⁶ upon inception NetCo would negotiate the purchase of the incumbent's or other participants' existing fibre assets on a commercial basis. In particular, these initial purchases would only involve areas in which the incumbent or any of the participating entrants have already deployed NGA networks.⁹⁷ As a result, the network topology for these areas would have to remain unchanged.

Allowing for some flexibility in the valuation of existing assets may potentially contribute to successful interaction among all investors. Leaving the valuation approach as a negotiating variable rather than a top-down prescription serves exactly this purpose. The menu of potential valuation approaches that could be presented to negotiating parties includes:

- **NBV:** the value to NetCo (and hence the value to the incumbent in meeting its commitment to fund NetCo) is set based on the value in the historical financial statements of the company;
- **replacement cost:** the value to NetCo is set based on the costs that would hypothetically be incurred by NetCo were it to rebuild this part of the network using the most efficient technology currently available (taking account of any quality differences in the outcome, if any).

⁹⁵ This type of issue became evident in the separation process undertaken in New Zealand, where the problem associated with the duplication of assets forced the network operator to share assets with the retail operator (according to arm's-length agreements). On that occasion, an independent monitoring entity was set up to ensure that this situation would not harm ServCo's market position. See Appendix for further details.

⁹⁶ See 'Ownership and financing' section.

⁹⁷ When Ofgem offered offshore wind transmission links in competitive tenders, it calculated transfer values that would reflect the economic and efficient cost of developing the assets being tendered, so as to give original developers a form of fair remuneration for the links they had constructed.

At least from a cost perspective, dark fibre assets may potentially be easier to value than copper assets, given the more recent installation date for the former. In particular, since the purchase of these fibre assets is reasonably recent, the two valuation methodologies described above (NBV and replacement cost) are likely to lead to similar value estimates.⁹⁸

4.5.1 Features

The envisaged design of the transition phase is set out below.

- Initially, the incumbent and participants divest all existing fibre assets, selling them to NetCo.⁹⁹ At this point, the incumbent retains ownership of its existing copper and infrastructure assets.
- As copper assets are gradually replaced by fibre, NetCo buys out the incumbent's copper assets.¹⁰⁰ However, these purchases would be limited to those cases in which copper assets are necessary inputs for fibre-access services (ie, copper sub-loops where FTTH is not feasible), and/or 'compensation' (if any) for the accelerated stranding of copper infrastructure where NetCo's services make these assets redundant.
- In areas where NetCo fibre is not deployed (ie, outside NetCo's agreed footprint at any particular time), the incumbent continues to provide copper access on regulated terms.¹⁰¹
- The incumbent leases to NetCo ducts and other passive inputs necessary for development of fibre network by NetCo within the agreed footprint area. These lease payments are part of NetCo's OPEX.

To ensure that all parties' interests are given adequate consideration in the transition phase as described above, a number of aspects need to be carefully monitored.

- Leasing prices for passive infrastructure set by the incumbent should be reflective of the regulatory approach to the relevant assets at the time. In situations in which duct access is not currently regulated and no explicit regulatory pricing exists, appropriate pricing could be determined in a way that is consistent with copper-access terms in the relevant country.
- NetCo, via the SBP, would set specific MDF notice periods and cut-off dates (with disputes being resolved through an arbitration process led by the regulator).¹⁰²
- Where fibre roll-out implies stranding of DSL equipment, no 'extra' compensation ought to be paid.

Pre-existing end-customers could be migrated to the services provided by NetCo's infrastructure through their respective service providers, according to the following principles.

- Where the service provider is an investor in NetCo (which would be the most common scenario) existing customers have the option to stay at the current pricing plan until the end of their contract with the service provider using the outputs (and prices) of NetCo as

⁹⁸ There are a number of precedents for such divestments in regulated network sectors. For example, in Germany, the incumbent, RWE, has reduced its stake in transmission assets to 25% from 100%. Partly, this was done to raise capital to invest in other areas, but it was also done to meet future grid financing requirements.

⁹⁹ A similar process took place in Australia, where the incumbent was paid \$AUD 9 billion by a structurally separated NBN Co for decommissioning and migrating services to the new network. On that occasion, the deal included access to fit-for-use infrastructure such as pits, conduits and ducts, as well as the right to acquire backhaul services and exchange space.

¹⁰⁰ NetCo pricing would need to be set at a level to ensure it has sufficient funds to complete these purchases.

¹⁰¹ See 'Topology and services' section.

¹⁰² See 'Governance' section.

the inputs to this continuation of service provision; move to a similar new plan from that provider;¹⁰³ migrate to high-speed service or cancel the service altogether.

- Where the service provider is not an investor in NetCo, if it has entered into a bitstream access service with a NetCo investor, NetCo will transfer wholesale provision to that investor and the service provider will continue to supply retail services. Alternatively non-investors may choose to enter into a pure resale/branding arrangement with a NetCo participant. The largest service provider (potentially the incumbent) would be the provider of last resort in the event that no other service provider is willing to serve these customers.
- In the event that a NetCo participant purchases (the customers of) an independent access seeker, standard merger control would apply. Further, a requirement of any such sale could be that a close equivalent service is offered to that customer by the purchasing operator.
- At the time of migration, NetCo would liaise with the service provider currently providing service to the end-user and the new provider. This information, however, would not be shared with other service providers.

A further potential feature of transition is that NetCo would incur the costs of switching customer premises equipment (CPE, including modems) and where copper is decommissioned, the service providers would not have the option of using their existing equipment. The benefit of such an approach is to ensure that customers are migrated to next-generation CPE as swiftly as possible. Otherwise, individual service providers may have incentives to recover the costs of existing equipment before migrating to NGAs. Clearly the cost is effectively borne by investors and hence the operators, but this practice would facilitate timely migration, which is a salient part of the NetCo model.

4.6 Topology and services

Under the status quo vertically integrated incumbents have control of investment in the access network. This could provide the incumbent with an incentive to tailor the wholesale inputs towards its own downstream retail units. A topology that is technically or economically difficult to interconnect with, or wholesale services that limit the ability to provide differentiated services, could be considered problematic and discriminatory by access seekers. Furthermore, entrants and the incumbent seem to have misaligned incentives with respect to the pace of network roll-out, given the uncertainty over stranding of current DSL equipment (see discussion on transition above).

There are a number of specific features relating to network topology and services, including interoperability and standardisation.¹⁰⁴ Many of these require close collaboration by the industry regardless of the underlying industry structure. Hence, while it is not within the scope of this report to discuss the details of each technical specification, the following outlines the principal features of NetCo topology and service offering that would seem important in order to realise the benefits of the co-investment model.

In principle, there are features in the NetCo model that could address the potential issues of topology choices. Unlike under vertical integration, it is in the interest of NetCo to run a network that is accessible to all participating service providers. The topology choice between point-to-point and point-to-multipoint (ie, multi-GPON or GPON or possibly FTTC) networks should reflect the overall strategic objectives (as set out in SBP and SDS) and allow a large degree of control over service specifications to the extent that this is possible.

¹⁰³ See 'Pricing' section.

¹⁰⁴ A summary of the CEO Roundtable discussions, held in spring 2011, is available at: http://ec.europa.eu/information_society/newsroom/cf/itemdetail.cfm?item_id=7211.

The following sets out principles for determining NetCo's asset base, the choice of NGA topology and wholesale services provided by NetCo.

4.6.1 NetCo's assets

A related problem is determining which assets should be controlled by NetCo versus the participating operators. From an economic perspective, it would be appropriate to allocate its assets on the basis of competition and demand characteristics, as follows.

Feature 1: NetCo's asset base would consist of non-replicable and passive fibre network elements

The criteria to determine which network assets would be owned and governed by NetCo should reflect the demand characteristics and the degree of competition. While the degree of competitiveness across networks varies between countries (eg, there is a variable level of competition with respect to backhaul connections and DSL electronics), there are benefits in allocating, as far as possible, the 'passive' elements in the NetCo model. Notably:

- including semi-competitive, replicable equipment in NetCo could raise regulatory concerns, given that such asset allocation would effectively disincentivise co-investing service providers from investing in their own active equipment, which in turn could hinder product differentiation and innovation;
- passive assets are subject to less cost uncertainty than electronics and have significantly longer asset lives, which would facilitate investment planning and pricing.

The risk of, and scope for, discriminatory behaviour would be lower, the simpler the systems interfaces and processes underlying NetCo's wholesale services. Consistent with economic principles, NetCo assets would therefore be:

- those that exhibit characteristics of a natural monopoly—ie, assets that are difficult or costly to replicate and whose duplication would be inefficient from the perspective of productive efficiency. This would be principally limited to fibre-access assets;
- those that are passive pieces of infrastructure and with respect to which there is limited scope for competitive innovation and product differentiation;
- those that underlie services with a low demand elasticity (in order to ensure as steady cash flows as possible).

The proposed approach is consistent with the recent establishment of Chorus, a structurally separated network operator in New Zealand. A summary of the asset allocation employed in New Zealand is provided in Box 4.5.

Box 4.5 Telecom New Zealand Asset Allocation

Following regulatory pressure to unbundle local loop access, Telecom New Zealand decided to voluntarily functionally separate into distinct wholesale and retail units in 2006. In October 2011, for participation in a nationwide NGA deployment its shareholders approved its structural separation into New Chorus (the network business) and New Telecom (the retail business) on the basis of an Asset Allocation Plan agreed with the NZ government.

- The Asset Allocation Plan follows the principle that passive network assets should be retained by the Chorus entity whilst active / replicable and assets that enable end product differentiation are retained by the New Telecom entities.
- New Chorus assets primarily consist of the passive fibre and copper networks, along with the OSS (Operations Support System) and BSS (Business Support Systems) that are used to deliver these services. New Telecom assets include the mobile network, voice and data service platforms, OSS/BSS systems for managing end-to-end services and retail distribution channels. Overseas assets such as stakes in foreign network operations remain on the balance sheet of

the New Telecom entities.

The asset split highlighted the problem of duplication of assets involved in the split which could potentially add to the costs of separation. A variety of assets were identified as ‘shared’. This resulted in the allocation of specific assets to a single owner based on the current ‘preponderance of use’. Arms length sharing arrangements were established, in particular for cost recover for fibre repair services.

A transparent mechanism of oversight in the allocation was used to ensure this does not place the new retail unit in a disadvantaged / advantaged market position.

Notes: Telecom Corporation of New Zealand Limited (2011), ‘Overview of the Asset Allocation Plan’, demerger document, September 6th. Telecom Corporation of New Zealand Limited (2006), ‘Telecom to separate wholesale and retail operations’, press release, June 27th.

Further, consistent with the above, separated entities in other sectors have generally controlled the most non-replicable network assets—ie, those that exhibit characteristics of a natural monopoly. Table 4.1 provides examples of utility sectors.

Table 4.1 Regulation and the scope of separation in utility sectors

| Sector | Scope of regulation | Structural separation | Form of regulation | Potentially competitive element |
|--------------------------|--|--|--|---|
| Airports | Aeronautical charges (non-aeronautical charges not directly regulated) | Airports separate from airlines (aeronautical and non-aeronautical) | Revenue yield cap (not all airports regulated); flexibility in setting prices for different products | (Some limited) competition between airports, but no competition using parts of airports |
| Electricity distribution | Use-of-system charges and connection fees | All uncompetitive elements (distribution, transmission system operator). Some minor elements (eg, metering) excluded | Hybrid price/revenue cap | Structural separation to competitive (generating capacity) and uncompetitive elements (transmission and distribution) |
| Gas | Use-of-system charges and connection fees | Majority of uncompetitive distribution network | Hybrid price/revenue cap | Elements of gas storage and LNG terminals regarded as competitive |

Sources: Ofwat (2007), ‘Guidelines for the regulatory accounts, regulatory accounting guideline 3.06’, February. Civil Aviation Authority (2005), ‘Airports Review Policy issues’, December. Ofgem (2007), ‘Gas Distribution Price Control Review: Final Proposals Document’, December 3rd. Ofgem (2006), ‘Transmission Price Control Review: Final Proposals’, December 3rd. Ofgem (2004), ‘Distribution Price Control Review—Final Proposals’, November 28th.

4.6.2 Features of topology

The problems identified above can be mitigated with a set of network service and topology principles that align the NetCo deployment with its stated objectives in terms of reducing incentives to discriminate and promoting an efficient investment. Hence, to the extent that it is feasible, it would seem advisable that NetCo commits to deploying point-to-point networks; where alternative topologies already exist, or are otherwise preferred, NetCo would provide active access. Specific features underlying this proposition are presented below.

Feature 1: NetCo will deploy point-to-point FTTH where possible: this may be limited to certain geographic areas and is likely to vary significantly by country

Where point-to-point networks are not economically or otherwise viable, NetCo would deploy alternative topologies. The likely preferred option would be a combination of multi-GPON and GPON networks. (The former could be more accessible given that a dedicated fibre would be controlled by each of the service providers).

While GPON and FTTC may have lower capital costs per household connected these solutions are also less flexible. Being shared access medium architectures, it is difficult to

unbundle at the physical access layer. This shared access also reduces deployment flexibility: optical splitters need to be in place before services can be commissioned, and distance and port loading maxima cannot be achieved simultaneously. GPON networks may also be more difficult to troubleshoot and have higher operating expenses.

Consequently, this solution would not be consistent with the fundamental objective of NetCo, as determined in the SDS: to provide an accessible platform for participating service providers allowing for as high a degree of product differentiation as possible. With current generation GPON and 10 GPON, physical layer unbundling is not possible, so active access (bitstream) would be provided.¹⁰⁵ Similar to GPON, FTTC networks might not be as conducive to competition as point-to-point fibre, but in some cases may exhibit substantially lower costs than FTTH networks.

Thus, NetCo's core product would be unbundled fibre access (FTTH). But NetCo would need some flexibility to deploy other topologies and technology where the cost premium of FTTH would make such deployment uneconomic. This would be subject to some conditions (see Feature 3 below).

Feature 2: for the SBP, an independent assessment of network costs of different topologies would be conducted

There have been a number of studies that have compared the network roll-out costs of GPON and point-to-point topologies in a variety of population zone types.¹⁰⁶ While GPON (and FTTC) topologies may be cheaper to deploy as a result of reduced civil engineering this cost advantage needs to be weighed against the NetCo objectives on competition, coverage, timelines, capacity commitments and upgrade path, as developed in the SBP.

Feature 3: where active access products are provided by NetCo, sufficient product differentiation should be ensured

It would seem unrealistic to assume that NetCo could deploy FTTH networks throughout all geographical areas. Indeed, in rural areas, the costs of point-to-multipoint networks would dictate the choice of technology. In these areas, NetCo would therefore provide active access services. NetCo's active access products would replicate unbundled access products in terms of control over quality of service specification (bandwidth, latency, transparency) to the extent that is economically possible.

- The virtual unbundled local access (VULA) product specified by Ofcom, and provided by BT over its NGA network deployment (generic ethernet access), could be a useful example. This is a Layer 2 ethernet-based product that can be configured by access seekers for the expedition of voice traffic and for IP (Layer 3) quality of service. There may be still parameters of the service that access seekers might wish to have control over.¹⁰⁷
- Given the importance of double-play and triple-play voice/data/TV bundles in the retail market active access should explicitly include voice capability. The technical specification of this voice capability should be 'open' to enhance downstream competition for voice services. A voice capability that binds a service to a legacy network or limits signalling and control capabilities of the voice services for interconnecting providers would be a barrier to competition.

¹⁰⁵ WDM (Wavelength Division Multiplexing) GPON could resolve this, by allowing physical layer unbundling over a single GPON/point-to-multipoint topology. The laser/transponder required for the CPE has tighter spectral width tolerances and is sensitive to temperature changes. This technology is expected to fall in cost over the next 5–10 years.

¹⁰⁶ Broadband Stakeholder Group (2008), 'Final report for the Broadband Stakeholder Group: The costs of deploying fibre-based next-generation broadband infrastructure', September 8th. WIK-Consult (2010), 'Architectures and competitive models in fibre networks', December.

¹⁰⁷ See also Vodafone (2011), 'Key Principles for wholesale access over next generation fixed networks', The Policy Paper Series, 13, June.

- Service specification should not discriminate. The NetCo approach should provide incentive for open, non-discriminatory service specification. The technical specification should allow service providers sufficient control to differentiate end-to-end services. The technical specification may need to classify or prioritise traffic types (ie, real time, interactive, transactional or best effort) but this should not discriminate the provision of retail voice and data service types. There are likely to be limitations on what data the service can carry (ie, maximum packet sizes) but in general the specification should permit the transparent handling of user data across the network, regardless of its content. Similarly, the operational specification (ordering, billing, provisioning, fault rectification) should be non-discriminatory across retail providers.
- Wavelength division multiplexing techniques (WDM) may allow physical unbundling of GPON networks at the optical (physical) layer. Currently the technology is not mature in terms of cost and operational aspects.¹⁰⁸ Should the technology mature sufficiently within the lifetime of NetCo's investment, it should be considered for upgrade of existing GPON and remaining deployment.

Feature 4: NetCo would be the provider of passive access; complementary products would be provided by other operators

Different operators have different backhaul network footprints and vary in terms of their ability to provide business connectivity services, which rely on complex combinations of network elements and wholesale inputs. The following principles would seem reasonable.

- Where not self-supplied, backhaul to point of interconnect should be provided by an alternate network operator or the incumbent.
- NetCo would principally sell only the passive access service from the customer premises to a defined mutualisation point (in many cases, the existing exchange/central office). Operators would continue to own and manage their own core networks.
- Where NetCo backhaul is used (eg, in a multi-GPON, GPON or FTTC topology), this should not be detrimental to service quality. Any backhaul service used should be transparent with respect to a NetCo bandwidth, quality of service and contention ratio specification.
- NetCo's product set would be focused on passive, non-replicable access inputs to the extent possible; high capacity business connectivity products (leased lines) would be self-provided, provided by the incumbent or another provider where necessary.
- NetCo's network architecture would be simple point-to-point (preferred) or point-to-multipoint. Complex and high availability topologies, such as dual homing¹⁰⁹ or ring architectures,¹¹⁰ are likely to be avoided for cost and technical reasons, since these would require more capital-intensive civil infrastructure. For this reason it is unlikely that NetCo could provide the access inputs for high-end corporate, financial or carrier-to-carrier services which typically demand such features. However ubiquitous NetCo's coverage in densely populated areas could make it a suitable input for business connectivity at the SME market. Currently this market is served in large part by symmetrical DSL or ISDN services. A large fibre roll-out may mean that a business service operator could potentially provide a step change in these services.

¹⁰⁸ Unit costs of WDM GPON networks are significantly higher than 'uncoloured' systems. Also 'coloured' WDM transponders require a very stable temperature-controlled environment, which cannot be guaranteed in the domestic environment.

¹⁰⁹ Dual homing is a network topology where the customer connection has two diverse connections to the network provider's network.

¹¹⁰ A ring architecture is a self-healing network topology that provides a protected transmission path between two or more nodes.

4.6.3 Further issues to consider

The choice of topology and services in an NGA deployment would also pose technical and practical problems. These issues are less economic in nature, but could still have cost implications and should be recognised.

- **Network management.** Topology complexities (active GPON devices, large amount of backhaul) are likely to raise the cost and complexity of network management systems for service provisioning, fault resolution, migration between service operators or service upgrades. Likewise a plurality of network platforms or vendors is likely to raise the burden of management in these areas. On the other hand, a diversity of suppliers or technologies may spread the risks of committing to one solution and increase NetCo's bargaining power with vendors.
- **Scalability.** GPON networks use a shared medium which is currently limited to 2.5Gbps (10Gbps in some cases)¹¹¹ downstream. If the upside demand scenario occurs this could make it difficult to upgrade as each customer transponder will need to operate at a much higher line speed. Point-to-point links can be upgraded individually, so future capacity expansions are straightforward.
- **Security.** The shared nature of GPON may mean that denial of service (DoS) attacks are easier if a line terminating transponder is compromised.

There are further complexities associated with services that are necessary complementary inputs for the provision of broadband services. Under the status quo, unbundled access seekers require colocation services at a local exchange and backhaul connectivity to their own network footprint. While this will still hold with a NetCo approach, fibre network technology permits longer signal paths, implying a reduction of local exchanges and redefinition of where access lines are aggregated.

The location and number of aggregation points will influence backhaul costs, with a potential to disadvantage smaller retail operators. To the extent that this problem would also exist under a status quo NGA roll-out, the NetCo approach with a mutually agreed topology should reduce this problem.

4.6.4 Costs of implementation

It is useful to present the operational changes in processes, systems, organisation and behaviour required to implement the separation of network activities from the retail operations. A qualitative assessment of the operational implications of these changes is presented below. Such costs are brought about primarily by the need to:

- replicate hardware and/or software;
- redesign certain existing systems and interfaces;
- implement new policies for database access;
- implement organisational changes;
- implement new wholesale processes possibly coupled with equivalence measures (equivalence of inputs and outputs, EOI or EOO);
- train many types of staff in using the changed systems.

Oxera's previous analysis has indicated that separation costs rise significantly in one or both of the following circumstances.¹¹²

- A separated operator increases the type of systems separation is considered. For example, Openreach estimated that its costs would increase by £40m to make each

¹¹¹ Standards have been set for XG-PON1 which permits 10GB shared downstream bandwidth, but no large-scale EU deployments have taken place to date.

¹¹² Oxera and Ellare (2009), 'Vertical functional separation in the electronic communications sector: What are its implications for the Portuguese market?', report prepared for ICP-ANACOM, July.

Openreach product compliant with EOI. This in addition to the costs incurred to create the Openreach infrastructure.¹¹³

- A separated operator has to make changes to the systems that support legacy products. These products will have been in place longest, will have seen myriad variants, and will have been supported by a complex interaction of legacy or specialised systems.

The cost of separation also increases in proportion to the number of separate units that are created. For example, where separate retail, access and wholesale units are created, costs will be greater than if the incumbent is split into just retail and wholesale units. Furthermore, each of the wholesale product variants—PSTN, broadband, leased lines, NGA products, duct access—will have unique elements of business and operational support (BSS/OSS) systems that will need to be altered if systems separation is desired.

In this respect, the fact that the NetCo model could cover only passive infrastructure assets—duct and dark fibre—could simplify its implementation. Moreover, as NetCo would principally consist of new assets and services, it should be less difficult and costly to implement than the separation of an existing operator. Indeed, Oxera's and Ellare's previous research has highlighted that the physical separation of BT's systems and processes with respect to legacy wholesale products was relatively costly, given that Openreach's product range covered legacy wholesale access products, notably wholesale line rental, in addition to the key physical access inputs (LLU and shared access) and certain (ethernet) backhaul services.¹¹⁴

4.7 Regulation

The role of regulators in the NetCo model has been discussed throughout this report. In particular, it has been noted that the NetCo model, as described here, would reduce the network operator's incentives to discriminate in anti-competitive ways and would, by design, lead to a more competitive downstream market structure than under the status quo. As a consequence, regulators could have sound reasons to commit to a less stringent set of remedies, if (and only if) the NetCo model was introduced in line with principles that ensure effective competition between service providers, and incentives for competitive investment in active equipment going forward.

4.7.1 The European Commission's objectives

It is necessary to recognise the European Commission's objectives against which the propositions on regulations could be designed.

Central to the European Commission's objectives is the concept of the 'ladder of investment', which relies on the assumption that entrants invest in capital assets progressively, as they acquire the critical mass of customers needed to make the next step of investment profitable.¹¹⁵ The theoretical underpinning behind the ladder concept is that 'good' regulation not only enables market entry but also encourages competitive investment making 'the next generation of technology contestable'. The principal implication of a co-investment model would be that the co-investing parties would pre-commit to a single last-mile network. The ladder of investment could still be applied, but the service providers would not replicate the assets owned by NetCo. This stems from the economic characteristics of NetCo's assets (ie, that replication of these assets is economically inefficient).

¹¹³ Ibid.

¹¹⁴ Ibid.

¹¹⁵ ERG (2004), 'ERG Common Position on the approach to appropriate remedies in the new regulatory framework', ERG (03) 30rev1, April. See, for example, Cave, M. (2006), 'Encouraging infrastructure competition via the ladder of investment', pp. 223–37, April/May.

In principle, European regulators seem to encourage co-investment models (as noted in section 2), although some caveats are highlighted:

Joint-ventures and other forms of co-operation between firms in this context are welcome and can indeed provide appropriate ways to bring together the sharing of investment and create synergies. However, they should be in conformity with competition rules and should not undermine the aims of the EU Regulatory Framework. For instance, when there is a joint venture that is jointly controlled by an incumbent and a new entrant, access conditions to the NGA infrastructure should follow the same principles.¹¹⁶

4.7.2 Access conditions under the NetCo model

The OECD has 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.¹¹⁷

Structural separation in itself may not, however, be a sufficient condition for the regulators to relax current rules, or pre-commit to a long period. A recent cross-sectoral review of structural separation in EU countries found that no deregulation had been observed in the cases analysed.¹¹⁸ It is also acknowledged that in the recently implemented structural separation of Telecom Zealand, Chorus, the structurally separated network entity, is subject to stringent EOI measures and monitoring procedures. On the other hand, partly because of the relatively good performance of Openreach (in terms of equivalence), Ofcom has proposed that all company-specific retail regulations of BT be removed in the UK, and has deregulated most of the wholesale broadband access market.¹¹⁹

Notwithstanding the fact that regulators have often been cautious about deregulating structurally (or functionally) separated network companies, there are sound reasons to suggest that the co-investment model described here would mitigate the regulatory concerns, or remove them altogether.

- Given the governance structure, there are several insiders (owners) with incentives to preserve downstream competition (and consumer welfare). Moreover, through the independent NetCo Board and the role of NGICC (see section 3) NetCo would have lower scope to discriminate between participants than a vertically integrated incumbent. NGICC would serve as a mechanism to ensure that NetCo could not favour any particular service provider, such as the incumbent, its largest customer.
- It is not envisaged that the pre-commitment though investment is a necessary pre-condition for the use of NetCo's infrastructure going forward. Rather, as described in section 3, it would be possible for new entrants to use fibre-access network either through purchasing a stake in NetCo or by negotiating commercial access terms in the wholesale market, whether through a bitstream access service or through a reselling arrangement. Thus, the 'ladder of investment' could still function, albeit on commercial terms.
- The regulator would be involved in the NGICC process (see section 3). Hence there would be an ex post monitoring scheme to ensure NetCo's compliance with the objectives on non-discrimination.

¹¹⁶ 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](http://erg.eu.int/doc/publications/erg_09_17_nga_economic_analysis_regulatory_principles_report_090603_v1.pdf).

¹¹⁷ 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](http://erg.eu.int/doc/publications/erg_09_17_nga_economic_analysis_regulatory_principles_report_090603_v1.pdf).

¹¹⁸ Salanave, J. (2007), 'The real impact of structural separation', *Communications and Strategies*, **65**, p. 185.

¹¹⁹ Ofcom (2009), 'Fixed Narrowband Retail Services Markets. Consultation on the Identification of Markets and Determination of Market Power', Section 1, pp. 1–3. Note that this excludes Hull.

These findings feed into the design of the key regulatory principles, presented below.

4.7.3

Features

The features below summarise the NRAs' role, on the basis of discussion presented in the above sections.

Feature 1: the regulator would commit to the overall plan

The regulator would commit to the features of the NetCo model for 15 years and to oversee the functioning of self-regulation, as described in section 3. The regulator would engage and commit only if a set of pre-conditions were met—ie, the SBP and NGICC were consistent with the principles set out in this report. In this process, it would seem appropriate to have a regulatory backstop to ensure that network planning does not give any stakeholder unfair competitive advantages and that wholesale processes are defined and implemented in accordance with best practice.

The regulator, however, has limited influence on industry development. It would thus not contribute to, for example, CAPEX planning, which would be left to the industry.

Feature 2: overseeing NGICC and arbitration—where disputes arise, the regulator could be the first independent arbitrator

NetCo would ensure compliance with the SDS and SBP, which the parties would have agreed at launch and which would be the underpinning of 'light touch' regulation. The NGICC would define conditions under which regulatory intervention would be warranted.

Circumstances under which the regulator would intervene would need to be specified ex ante in the NGICC. These include, but may not be limited to, the following.

- If there are any proposals on NetCo's CAPEX that are not in line with the SBP and are proposed by the majority (either one or more participants with a collective majority of equity), but are not supported by all participants, they would be resolved through a resolution mechanism chaired by the regulator or an independent arbitrator (the arbitration structure could vary by country, given the existing frameworks in different Member States). Less material amendments (contracting, payments systems, maintenance, operations) would be decided by the NetCo Board (this type of structure has been proposed for the UK energy code).¹²⁰
- If there are complaints backed by evidence on discriminatory behaviour in wholesale processes—ie, if NetCo's performance in terms of KPIs is not consistent with the pre-determined targets set out in SLAs.
- If NetCo's returns (internal rate of return) substantially and persistently exceed its cost of capital beyond a pre-defined excessive level.

The third criterion is articulated in further detail below.

Feature 3: ensuring NetCo's pricing is reasonable and not anti-competitive

NetCo would not be subject to stringent price regulation, as described in sections 4.4 and 4.5. Two conditions are critical:

- it would be specified ex ante that NetCo is not allowed to unduly discriminate between its customers (ie, in the first instance, participants). Should NetCo decide to sell its output to non-participants, again, within that class of customer, NetCo would be under an obligation not to discriminate in an anti-competitive way;

¹²⁰ The Brattle Group and Simmons & Simmons (2008), 'Critique of the industry codes governance arrangements: A report for Ofgem', June.

- NetCo's returns could be monitored ex post. Only if there was compelling evidence that NetCo's returns were manifestly excessive and above a pre-set 'safety cap', would intervention by the regulator be necessary and permitted. Box 4.6 articulates the principles for the proposed approach, although the detailed design of the cap needs to be developed.

Box 4.6 Principles of 'safety cap' to monitor NetCo's returns

If NetCo's returns are persistently and substantially above its cost of capital, NetCo's prices could be deemed excessive, and regulatory intervention could be warranted. Put another way, the likely regulatory concern is that NetCo, which may possess SMP in the provision of access, will have incentives to price at a monopolistic, rather than a cost-recovering, level, which in turn could result in higher retail prices (note that NetCo's prices reflect both its high fixed and relatively low variable costs).

NetCo's market power, and its ability to discriminate between participants would however be somewhat constrained due to its ownership structure and the governance rules outlined above: critically, NetCo would not be a simple, structurally separated upstream monopolist, but rather its pricing is designed to meet the requirements of its (asymmetric) owners downstream whose pricing power may be limited by demand characteristics (and potentially competition from alternative platforms).

Nevertheless, while providing NetCo with the ability to price-discriminate in an efficient manner, the approach to monitor that NetCo does not exploit its position would be specified upfront in the SBP.

Conceptually, the firm-specific returns can be higher than expected and hence higher than the WACC if this is due to successful risk-taking, therefore:

- investments are irreversible with uncertain demand;
- the returns result from significant innovation;
- expected returns at the time of investment are in line with the cost of capital.

Ex ante (before the investment decision), in order for NetCo's participants to commit capital, they need to expect to break even on average and earn a return commensurate with the upfront risk. If the upside scenario occurs, the actual return (internal rate of return, IRR) would exceed the required return (ex ante cost of capital), while in the downside the returns would be less than the cost of capital (notwithstanding certain measures that are introduced to minimise losses in the downside, as discussed above). The salient difference of the NetCo model relative to the status quo is that the regulator would not revise prices that incorporate the allowed return in the event of upside demand outturn (15-year commitment discussed above).

The regulator would, however, intervene if the returns were persistently and substantially above the cost of capital to a pre-determined 'excessive' level, and the profitability gap could *not* be explained by risk-taking at the time of the investment. In other words, NetCo would be gaining excess returns because of anti-competitive behaviour. Thus, the 'appropriate' upside is one where take-up for a given level of prices is higher than expected, not a scenario where NetCo distorts competition in the market.

There are various precedents in the UK, where the Competition Commission has examined ex post whether high returns indeed result from innovation and risk-taking.¹ Another interesting precedent is the retrospective monitoring scheme introduced by OPTA, the Dutch telecoms regulator. Every three years, the actual IRR is checked against the maximum allowed IRR, which builds on the fixed-line regulatory WACC, the premium for fibre-investment-specific risks, and a premium for the 'asymmetrical regulatory risk'. OPTA intervenes if the rate of return is too high, but not if it is too low.²

Notes: ¹ For discussion, see Ofcom (2010), 'Assessment of Sky's profitability and cost of capital Annex 3 to Pay TV – Statement', March 31st. ² OPTA (2008), 'Draft policy rules: tariff regulation for unbundled fibre access', November.

5 Recommendations

The NetCo model described above would represent a significant, but achievable, change in industry engagement, and, if implemented appropriately, a coherent framework for fibre investment in the EU. As set out above, the NetCo model is:

- an industry-led solution;
- designed to achieve high stakeholder legitimacy;
- risk-reducing;
- founded on practices already applied in other network industries.

In order to take the NetCo model forward, the following recommendations are made.

1. In order for the benefits of NetCo to materialise in full, and in line with the timetable set out in the Digital Agenda, timely actions are required from the industry and policy-makers. The European Commission needs to set out guidelines for industry engagement on possible co-investment models, particularly the process to be followed and the high-level principles on various aspects of implementation, including financing and ownership, pre-commitment conditions, terms for exit and entry, pricing flexibility, services and regulatory backstop. This should form part of the ongoing process by which Member States are setting National Broadband Plans in line with the Digital Agenda targets.¹²¹
2. In each Member State, industry should be encouraged to come forward with coherent proposals on how such risk-sharing, co-investment models could be implemented. The proposals in this report are founded on principles and precedents from other industries and are intended to be a first contribution to this debate. However, there may be alternatives to the specifics of the model envisaged here. It will be important that any alternative features are coherent overall, time-consistent and robust, as articulated in this report.
3. Policy-makers should set a deadline for the agreement and adoption of such industry proposals with a clear indication of the counterfactual should no collaborative proposal be forthcoming in a particular Member State.

¹²¹ Such guidelines would be consistent with the already announced plans for European Commission Guidelines on the use of EU funds and broadband investment. See http://ec.europa.eu/information_society/newsroom/ct/fiche-dae.cfm?action_id=204.

A1 Regulation of NGA in the EU

Table A1.1 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 the 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 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 | n/a |
| 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 A1.2 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 on markets 4 and 5 to ensure consistency |
| Estonia | Mandatory | Access, non-discrimination, transparency (including a reference offer) and cost accounting obligations (retail minus) | Price cap | Not available |
| Finland | Not available | | | |

| Country | Availability | Current regulatory obligations | Costing issues | Pricing |
|--------------------|---|--|---|--|
| France | Not available | | | |
| 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 retail-minus | Cost orientation of prices. No upfront payments or volume discounts exist |
| Slovenia | Access to bitstream was already imposed in the previous round of market analysis and will also be imposed based on the market analysis notified in November 2010. | Access to and use of certain network elements and facilities that are necessary for bitstream access, non-discrimination, transparency, price control and cost accounting obligations, obligation of accounting separation | Retail-minus | Retail-minus price |

| Country | Availability | Current regulatory obligations | Costing issues | Pricing |
|-----------------------|---|---|--|--|
| 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 CHF 26.60–29.10/month, including phone line |
| United Kingdom | 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 FTTP deployments) | No obligations on costing for mandated product | No notable pricing features at this point; no regulated controls on prices |

Source: BEREC.

A2 Case studies: overview

Extensive cross-sector and cross-country research has been undertaken to identify viable implementation schemes for the NetCo model. Given the unique characteristics of the telecoms sector, no single case study is an exact match for the NetCo investment. Nevertheless, a range of examples from other sectors provides useful insights into particular features of the NetCo model. The case studies selected for this study exhibit characteristics similar to the NetCo model in terms of co-ownership structure and large upfront investments.

Table A2.1 gives an overview of the case studies reviewed and briefly describes their relevance to the NetCo model.

Table A2.1 Case studies: an overview

| Self-regulation/code of conduct | |
|---|---|
| UK electricity: Connection and Use of System Code | Insights into governance structure and the role of industry code in self-regulation |
| UK electricity: Balancing System Code | As above, although appears to be more applicable to operational aspects of NetCo, rather than roll-out/CAPEX. Streamlining of governance: amendment process may limit alternatives for consideration |
| The Netherlands: NMa, airports | Managing information asymmetry between players; alignment of investment and capacity planning decisions; stakeholder participation; role of quality (ie, SLAs) as part of the industry code |
| The Netherlands: NMa, rail | Self-regulation rules to ensure non-discrimination and efficient allocation of capacity |
| Co-ownership/financing/governance | |
| Nord Stream Pipeline | Evidence on staged financing arrangements and dynamic evolution of investors' role; stakeholders' engagement throughout the process |
| Gassled | State-led structural separation with progressive entry of financial investors into equity capital |
| Mackenzie Valley Pipeline | Insights into pre-development phase: open-season process; pre-commitments and contractual options to adjust capacity or to terminate the contract |
| Other case studies reviewed | |
| NATS (aviation) | Importance of contracting issues and leverage under demand uncertainty (public-private partnership structure and hence not fully compatible the NetCo model) |
| Germany: electricity transmission (Amprion) | Voluntary divestment of incumbent stake in the core network assets in order to raise capital and finance other investments |
| UK rail | Planning of network investments through consultations; design of incentive schemes to address the risk of coordination failures |
| Mobile phone operating systems : Symbian | An example of a large-scale co-financed R&D investment with a degree of demand uncertainty and a structure in which the participants compete in the downstream market Relevance to NetCo limited, to some extent, by the presence of network |

| | |
|--|--|
| | effects and characteristics of two-sided markets—all participants have incentives to allow new entrants to participate |
| Financial services: dealer payment/clearance platforms | Coordination of commonly funded/used platforms by symmetric participants in terms of size and scope. However, this does not typically involve large upfront investments |
| Financial services: payment cards | Governance structure relevant, but the low investment cost and network effects make this not similar to NetCo |
| Sub-sea cables (telecoms) | High upfront costs shared by competing operators |
| Telecoms case studies | Separation in New Zealand and Australia—relevant in terms of products, pricing and transition schemes; examples from European countries are relevant for identifying the counterfactual. The study also draws on examples of functional separation—in particular, BT/Openreach |

A2.1 Lessons from selected case studies: minority shareholder protection

As discussed in the main body of this report, given the inherent asymmetry that would be likely to characterise NetCo’s participants in the pre-development phase (the incumbent’s stake and contribution at launch are likely to be much larger than those of other service providers), it is useful to design governance mechanisms that guarantee sufficient protection to minority shareholders. Indeed, such mechanisms are important in ensuring continued interest in the project by all co-investors.

This type of problem is compelling, for example, in the energy sector, where joint pipeline investments are often associated with asymmetric ownership structures (see below). Table A2.2 below gives an overview of the ownership structures that characterise co-investment projects in the energy sector. As can be inferred from the table, large asymmetries appear to arise in these co-investment schemes, possibly due to the differentiated contribution of participating investors.

Table A2.2 Ownership structure

| Example | Ownership structure | Notes |
|---------------------------|---|---|
| Mackenzie Valley Pipeline | Imperial Oil (34.2%); Aboriginal Pipeline Group (33.3%); ConocoPhillips (16%); Shell (11.2%); ExxonMobil (5.3%) | Imperial Oil manages all construction and operating activities and contracts (on behalf of the owners) directly with all shippers |
| Nabucco Pipeline | Equal shares: Botas AS (16.7%); Bulgarian Energy Holding EAD (16.7%); Mol Plc (16.7%); RWE AG (16.7%); Transgaz SA (16.7%); OMV Gas & Power GmbH (16.7%) | Nabucco Gas Pipeline International GmbH (a new entity) will be the only company in direct contact with the shippers. It will operate as an autonomous economic entity in the market, acting independently from its parent companies |
| Nord Stream Pipeline | Gazprom (51%); BASF (15.5%); E-on (15.5%); Gasunie (9%); GDF Suez (9%) | Nord Stream AG (a new entity)—the representation in the shareholder committee is proportional to equity stakes |
| South Stream Pipeline | Gazprom (50%); ENI (20%); BASF (15%); EDF (15%) | This project is still in the pre-development phase |
| CATS Pipeline | BG Group (62.42%); BP (36.01%); ConocoPhillips (0.66%); Total (0.57%); Eni (0.34%) | BP operates CATS on behalf of the joint-venture group |
| Gassled | Petoro AS (45.8%); Statoil Petroleum AS (28.5%); TOTAL E&P NORGE AS (6.1%); Njord Gas Infrastructure AS (8.0%); A/S Norske Shell (5.0%); Norseas AS (2.3%); ConocoPhillips Skandinavia AS (1.6%); Eni Norge AS (1.3%); other (1.4%) | The administration and operation of the pipelines is delegated to Gassco, an open and transparent independent operator |

Sources: Mackenzie Valley Pipeline (2004), 'Application to the National Energy Board for Approval of the Mackenzie Valley Pipeline' (August), Volume 2: Economics, Tolls and Tariffs, Section 1.1: Pipeline Proponents and Financing, pp. 1–3, available at: http://www.mackenziegasproject.com/theProject/regulatoryProcess/applicationSubmission/Documents/MGP_CP_CP_Vol2_Section_1_S.pdf; Nabucco Gas Pipeline, 'Shareholders', available at: http://www.nabucco-pipeline.com/portal/page/portal/en/company_main/shareholders_link; Nord Stream, 'Our Shareholders', available at: <http://www.nord-stream.com/about-us/our-shareholders/>; South Stream (2011), 'New Shareholders From Germany and France Join South Stream', (September 16th), press release, available at: [http://south-stream.info/index.php?id=38&L=1&tx_ttnews\[tt_news\]=233&cHash=e5e7cd4b62](http://south-stream.info/index.php?id=38&L=1&tx_ttnews[tt_news]=233&cHash=e5e7cd4b62); Central Area Transmission System, 'CATS Group and History', available at: <http://www.catspipeline.com/cats/content/brochure/brochure.asp?sectionid=3>; Gassco (2011), 'Gassled', June 17th, available at: <http://www.gassco.no/wps/wcm/connect/gassco-en/gassco/home/om-gassco/gassled>. Nabucco Gas Pipeline, 'About us', available at: http://www.nabucco-pipeline.com/portal/page/portal/en/company_main/about_us; Nord Stream, 'Our Management', available at: <http://www.nord-stream.com/about-us/our-management/>; Gassco, 'Operator Duties', available at: <http://www.gassco.no/wps/wcm/connect/Gassco-EN/Gassco/Home/om-gassco/operatorrollen/>.

Drawing on the lessons from these case studies and from the broader academic literature, three forms of protection appear to be available to minority shareholders:

- default rules;
- additional provisions;
- composition of the board of directors.

In most EU jurisdictions, measures that ensure that blockholders' voting is exercised with a consideration of minority interests automatically apply to shareholder agreements (even if not explicitly stated).¹²² Forms of protection for minority shareholders include:

¹²² For further discussion, see Armour, J., Deakin, S., Lele, P. and Siems, M. (2009), 'How do Legal Rules Evolve? Evidence From a Cross-Country Comparison of Shareholder, Creditor and Worker Protection', *American Journal of Comparative Law*, 57:3, pp. 579–629; and Becht, M., Bolton, P. and Roell, A. (2005), 'Corporate Governance and Control', ECGI Working Paper Series in Finance N. 02/2002, August, p. 1.

- a high quorum or supermajority voting rules as regards corporate actions that are likely to harm minority shareholders;
- fiduciary duties imposed on majority shareholders;
- appraisal rights allowing a minority shareholder to exit with full compensation;
- requirement of approval from a public authority.

To some extent, the default rules noted above can be amended by the parties in their investment agreement. Overall, limited reference to this type of amendment is found in publicly available documents, possibly owing to an assessment on the part of the negotiating parties that no additional bylaws are necessary in order to grant adequate protection to minority stakeholders, or to the confidential nature of the agreements.

Ensuring that sufficient representation is granted to minority shareholders on the board of directors also seems to be a common solution to asymmetric ownership structures.¹²³ Useful insights into this are provided by the Gassled and Mackenzie Valley Pipeline case studies.¹²⁴ In the former, operation of the infrastructure system is delegated to Gassco, an independent entity in charge of managing the network in an equitable manner, according to a predetermined set of rules.¹²⁵ In the latter, restrictions on the power of large blockholders were inserted into a set of rules intended to drive subsequent expansions of the pipeline system.¹²⁶

A2.2 Lessons from selected case studies: Code of Conduct

Based on case studies from the rail, aviation and energy sectors in the UK, at least two options appear to be available for NetCo, should a more ‘hands-off’ approach to regulation be agreed:

- **Code of Conduct**—a charter outlining a dispute resolution mechanism and regulating relations among all the parties involved has been developed in the UK for regulating access to the national electricity grid;
- **consult-and-negotiate framework**—this light-touch form of regulation consists of designing committees for all stakeholders and forcing players with greater bargaining power to engage with players in weaker positions. Examples of this kind of framework are numerous in the Netherlands, where they have been implemented by the competition authority in the Netherlands, Nederlandse Mededingingsautoriteit (NMa), in the rail and aviation sectors.

Both types of measure have been explored in the past where asymmetries among stakeholders have made it challenging to balance stakeholders’ interests (see case studies below). These two measures are not mutually exclusive—on the contrary, based on a survey of previous cases studies, it would seem that a combination of these two types of self-regulation has been adopted.

A2.3 Selected case studies: CUSC, UK electricity sector

The Connection and Use of System Code (CUSC) is the self-governing code of users of the UK’s national high-voltage electricity transmission system, dealing with connection to, and use of, the National Grid. Compliance with the CUSC is a requirement for all generation, supply and distribution licence-holders.

¹²³ See the Nabucco Pipeline description below, highlighting how board membership by minority stakeholders can indeed characterise this type of co-investment project.

¹²⁴ For further details on these case studies, see below.

¹²⁵ See Gassco, ‘Capacity Management’, available at: <http://www.gassco.no/wps/wcm/connect/gassco-en/gassco/home/varvirkosomhet/kapasitetsadministrasjon>.

¹²⁶ Mackenzie Gas Producers Group (2005), ‘Ownership Agreement Principles’, November, p. 8.

The CUSC is divided into sections, including some that deal specifically with connection to, and use of, the system. The connection side of the Code has both investment and CAPEX implications, since it covers aspects such as construction, credit requirements, disconnection and decommissioning. The use-of-system section, on the other hand, governs operational decisions and covers charging arrangements, ancillary services, and certain demand balancing services.

Exhibiting similarities to the NetCo model, the high-voltage electricity transmission system is characterised by large asymmetries in the stakes of participating actors, and the CUSC is a code designed to deal precisely with these asymmetries. According to the Code, indeed, National Grid, the largest party, retains only some residual power (National Grid appoints a non-voting Chairman and two out of the 11- or 12-member amendment panel, with only one vote between them). Also, the Code sets out the rules according to which potential disputes are to be resolved. With respect to this, the CUSC designates the regulator (or the Electricity Arbitration Association) as the final arbiter in cases in which even the dispute resolution mechanism fails to attain agreement between operators. As an additional safeguard, the regulator is the final arbiter of any change to the CUSC.

It is worth observing the limited scope for the CUSC to deal with simultaneous amendments to the code itself. Indeed, the process set forth in the CUSC allows for spurious proposals and unlimited amendments to proposals (with no preliminary screening). This may potentially impose constraints on high-level policy changes that require staging. A major change in market structure, for example, may require members to agree on general principles and objectives in the first stage, with the second stage dealing with technical and implementation issues. Also, while any member can propose an amendment, there are limited incentives to analyse the impact of proposals.

Consequently, in devising a CUSC-like code of conduct for NetCo, it will be important to address the aspects outlined above. For instance, this could be done by creating a two-stream decision-making process, whereby the regulator could propose high-level policy amendments and manage the whole process, with less 'material' issues left to self-governance.

A2.4 Selected case studies: BSC, UK electricity sector

Another interesting case study is that relating to the Balancing and Settlement Code (BSC), the framework implemented in the UK to govern the real-time balancing and imbalance-settlement process of wholesale electricity. Parties subject to this Code are generators, suppliers, distributors and interconnectors. The BSC, which is administered by Elexon (the Balance and Settlement Code Company), specifies the system and methods of sale, purchase and transmission of wholesale electricity, as well as the metering and financial settlement of quantities within bilateral contracts (on the imbalance-settlement side).

The framework delineated in the BSC also encompasses a balance system of offers and bids dealing with transmission system constraints. Indeed, an excess (shortfall) of demand over supply could result in the system frequency falling (rising) beyond service specifications.

Like the CUSC, the BSC example highlights the need for efficiency and certainty of the governance framework, together with a robust framework that can guide the implementation of simultaneous reforms.

Unlike the CUSC, the BSC has an internal modification group which can propose an alternative to a submitted amendment (although there is no requirement to do so). Only one such alternative can be proposed, and the objective in doing so is to identify and remedy defects in the original proposal. This streamlines the amendment process.

A2.5 Selected case studies: NMa, the Netherlands aviation and rail sector

A self-governance scheme of potential interest to NetCo's co-investors is that devised by the Netherlands competition authority, the NMa. Throughout the years, the NMa has managed to establish light-touch consult-and-negotiate frameworks in several sectors, including rail and aviation, in contrast to other ex ante approaches to regulations that tend to be more interventionist.

The interesting feature of these light-touch regulation schemes is that they are restricted to only a subset of the activities undertaken by the regulated entity. For instance, in the aviation industry, regulation applies only to take-off, landing and parking of aircraft and handling of cargo, passengers and their luggage, respectively. Commercial activities (such as shopping and parking), real estate and participation investments are not regulated.

Some degree of differentiation characterises this regulatory framework in the aviation sector, as opposed to the rail sector. Description of the regulatory arrangements in place must therefore be differentiated accordingly.

The aviation sector

In those activities that are regulated, the NMa sets out guidelines to be followed by regulated companies when setting their tariffs. In particular, the airport operator is obliged to devise a tariff scheme that is simultaneously 'cost-oriented', 'non-discriminatory', and 'reasonable', to consult with the airlines on tariffs and conditions, and to produce regulatory accounts. The NMa also takes part in this process by approving the airport's cost system. That said, the NMa has no role in assessing upfront CAPEX or OPEX efficiency. Investments (and the associated costs) are therefore assessed ex post.

The NMa framework was set up to address problems that are similar in nature to those of the NetCo investment (eg, market structure, particularly at hub airports). Also, investment in the underlying infrastructure in the Dutch aviation industry is often undertaken to address the incumbent's needs.

The rationale behind this consult-and-negotiate framework is akin to that envisaged for NetCo. Indeed, this negotiation framework was introduced in the hope of increasing countervailing buyer power in downstream markets by reducing information asymmetries, alleviating transaction costs, and involving a spectrum of end-users in the tariff-setting process. This attempt at improving buyer power was undertaken with the ultimate objective of limiting the monopoly power of upstream operators and fostering improved market outcomes as a result (see discussion in section 3 on regulator's incentives).

Given all the similarities with the NGA investment under analysis, the consult-and-negotiate framework of the Dutch aviation sector could therefore inform the design of a similar framework for NetCo. For instance, an evaluation of the governance system at Schiphol Airport in the Netherlands identifies the following lessons:¹²⁷

- **completeness of proposals**—due to the timing of the consultation process, investment and capacity are not always coordinated in an optimal way. This type of coordination needs to be addressed in the NetCo model, where roll-out or expansions and, for example, GPON capacity upgrades may require strong interaction and engagement among all stakeholders;
- **representation**—in practice, the consultation process should not favour larger companies over smaller (this type of asymmetric treatment has been identified as something that requires attention in the aviation sector). Also, the motivations and

¹²⁷ Ecorys (2010), 'Evaluatie Wet luchtvaart inzake de exploitatie van de luchthaven Schiphol (Evaluation of the Aviation Act governing the operation of Schiphol airport)', November 26th.

justifications provided by the airport operator are confined to private correspondence and are therefore not subject to public scrutiny. It is thus important to engage the industry in a transparent process when determining NetCo's overall objectives and the SDS;

- **quality considerations**—these could be crucial to the success of NetCo, given that decisions on days to connect/disconnect, fault restoration times, switching operator times, broadband speed and total downtime represent key aspects of the implementation process.

The rail sector

A framework to foster engagement of all stakeholders has also been devised for the Dutch rail sector, characterised by a rather peculiar structure: the Dutch Ministry of Transport has assigned long concessions to ProRail (and its part-owned subsidiary, KeyRail) for the provision of rail infrastructure, and to NS Rail for passenger rail operations in the core part of the network. ProRail and NS Rail are required to reach agreement on access to these core lines. Other operators willing to provide services on other peripheral lines are required to secure an access contract with ProRail first.¹²⁸ Given that both passenger and freight operators bid for the same capacity and that freight forms only a small portion (8%) of the overall rail transport sector, an inherently asymmetric structure characterises the group of bidders.

To facilitate interaction between the infrastructure manager (IM) and these asymmetric bidders, the NMa has established a consultation framework with three main phases.

- **Phase 1**—the IM is obliged to consult annually on the Network Statement with rail users (RUs). Following consultation, the Network Statement is binding on the IM.
- **Phase 2**—RUs submit their capacity requests (capacity allocation itself is an iterative process). The IM is required to allocate capacity among RUs on a non-discriminatory basis.
- **Phase 3**—an RU must reach an access agreement with the IM, and can negotiate these terms with the IM. The IM must levy the same charges for all RUs within the same RU segment (eg, within passenger services; within rail), but can agree on add-on services provided to an operator in any one segment.

This three-phase framework was devised in the context of a vertical integration/separation process (infrastructure versus rail operator) with large asymmetries among stakeholders. It therefore appears to be directly relevant to the NetCo model. In particular, insights into the network capacity allocation method and non-discriminatory access rules (resulting in smaller players gaining from negotiations led by larger downstream players) can be extracted from the Dutch rail case study.

Nonetheless, it is important to observe how some of the problems that affected the aviation consult-and-negotiate framework seem to apply to the rail sector too, and these lessons are therefore reflected in the governance framework envisaged for NetCo. For instance, allegations have been put forward that IM (ProRail) has favoured the largest downstream player (NS Rail) in terms of operational decisions (prioritisation after service disruption) or CAPEX and investment decisions.

¹²⁸ See, for example, Leijten, M. and Koppenjan, J. (2011), 'Asset management for the Dutch railway system', Next Generation Infrastructures Conference, Systems of Eco Cities, Shenzhen, China, November 11th–13th, p. 1.

A2.6 Selected case studies: Altalink, Canadian energy sector

Altalink is an electric transmission system which services around 85% of Alberta's electrical transmission requirements. The system spans the most densely populated parts of southern Alberta (eg, the areas around Calgary and Edmonton). Originally owned by TransAlta Utilities Corporation (TransAlta), the transmission system was transferred in 2001 to a consortium comprised of Macquarie (15%), SNC-Lavalin Inc. (50%), Ontario Teachers' Pension Plan Board (25%) and Trans-Elect Inc. (10%).¹²⁹

Given the large asymmetry inherent in the initial shareholders' capital of this venture and the magnitude of the investment (around C\$900m), the Altalink investment seems to offer insightful messages for the NetCo model.¹³⁰ In particular, from a governance perspective, the Altalink project shares with NetCo the characteristic of potential asymmetries among the investment partners. Indeed, since 2001, significant restructuring of the ownership structure has characterised the Altalink venture. Progressive concentration of equity stakes led to SNC Lavalin gaining full control over the joint venture in September 2011.¹³¹ This outcome was facilitated by a clause in the original shareholders' agreements of a right of first refusal, which can be regarded as conducive to this type of structure.¹³² Under the NetCo model, this feature would be addressed by the pre-determined rules on entry and exit, and minimum and maximum ownership stakes.

Unlike NetCo's investors, none of the initial owners of Altalink operated directly in the downstream market—ie, required usage of the system. This feature of the Altalink project removed many of the governance issues, such as the need to balance ownership rights with usage rights.

¹²⁹ Macquarie, 'Altalink L.P.', available at: http://www.macquarie.com/ca/asset_profile_altalink.htm.

¹³⁰ Dealogic M&A Analytics and Kiladze, T. (2011), 'SNC-Lavalin forced into full ownership of AltaLink', February 11th, Globe and Mail Blog, available at: <http://www.theglobeandmail.com/globe-investor/investment-ideas/streetwise/snc-lavalin-forced-into-full-ownership-of-altalink/article1903592/>.

¹³¹ Dealogic M&A Analytics.

¹³² See SNC Lavalin (2011), 'SNC-Lavalin Exercises Right of First Refusal for Remaining Interest in Altalink', February 11th, press release, available at: <http://www.snc-lavalin.com/news.php?lang=en&id=1331>.

A3 Ownership and financing

A3.1 Lessons from selected case studies

A thorough analysis of previous co-investments (with a particular focus on the energy sector) yielded insightful messages that can be used to inform NetCo's ownership and financing structure. In particular, some of the key features of the case studies that could be transposed to the NetCo model are as follows:

- **stakeholders' consultations in the pre-development phase** aimed at profiling risk across time and assessing the overall financing needs of the project, given the availability of internal financial resources. With respect to this point, the open-season processes undertaken within certain pipeline projects are reviewed;
- **staged financing**, which may help reflect more accurately the dynamic evolution of investors' appetite. An example of this approach to financing is that of the Nord Stream Pipeline project.
- **Staggered entry of heterogeneous investors into equity capital**—changing the capital structure across time and progressively allowing non-operating investors into the equity capital may prove useful instruments to deal with the dynamic profile of investors' risk appetite, and the progressive reduction in residual risk. It is important to note the interactions between this final point and the decision to decouple ownership and usage of the NGA network. In relation to this, valuable insights are offered by the Gassled case study, in which this type of interaction was manifest.¹³³

A3.2 Selected case studies: Nord Stream Pipeline, EU oil/gas market

The Nord Stream Pipeline project began in 2005 with the objective of constructing a submarine pipeline to connect Russian gas regions to the European consumer markets (Germany). Backed by a number of EU countries, this co-investment scheme has been undertaken by a consortium of oil and gas companies operating in the EU market. The pipeline is expected to become operational in 2011/12.

The Nord Stream Pipeline project resembles the NetCo project, since it is an example of a large-scale investment requiring the payment of a significant upfront cost by co-investors. Also, just as in the NetCo model, the NordStream project entailed considerable involvement by all stakeholders' in the pre-development phase (necessary to gather sufficient consensus around the investment) and multiple rounds of consultations with national regulators.

In particular, one feature of the Nord Stream project may yield insight into the design of the NetCo model; namely, the staged financing scheme implemented to secure funds for the development of the pipeline. This financing scheme, which comprised two rounds of fundraising, highlighted the changing nature of investors' interest in the project across time. Indeed, more favourable terms were secured in the second round of financing (due to lower levels of risk as the project implementation was taken forward). This difference in financing terms eventually led co-investors to attempt a renegotiation in the second round of the financing received in the first round.¹³⁴

¹³³ See Gassled case study below and 'Entry and exit' Appendix.

¹³⁴ See Nord Stream AG (2011), 'Nord Stream AG Seeks Amendment of Phase I Pricing Levels', press release, September 13th.

A3.3 Selected case studies: Gassled, EU oil and gas market

Gassled is a partnership set up in 2003, when the Norwegian government merged eight offshore pipeline-operating companies belonging to Statoil and nine other companies to create a single entity that would own the offshore natural gas transportation infrastructure on the Norwegian Continental Shelf. The objective of the merger was to comply with the EU gas market Directive, with the ultimate goal of ensuring ‘economic returns earned from producing fields and not from the transportation system’.¹³⁵ While the pipeline system is owned by partner oil and gas companies, it is operated by an open and transparent independent operator—ie, the state-owned Gassco.

Even though the Gassled case study differs from NetCo—in that it was a state-mandated solution rather than a voluntary co-investment by the pipeline owners—the Gassled experience can still be relevant to NetCo, given that this Norwegian initiative led to the joint ownership of a gas transportation system by companies competing in the downstream market, and given the asymmetric ownership structure of the joint venture (the main shareholder, Petoro AS, has a 42% stake, which is much larger than that of all the other co-owners).

One of the most interesting features of the Gassled project is the role played by Gassco, which is in charge of overseeing the functioning of the co-ownership scheme and of ensuring a fair treatment of all stakeholders. Indeed, one of its tasks is to ensure that the interests of both minority stakeholders and third parties are taken into due consideration in the management of the network and in the capacity allocation process.

The separation of the financial returns associated with Gassled shares and the profits in the downstream market is also a characteristic that could potentially be transposed into the NetCo model. In the Norwegian market, this very separation led to a progressive substitution of operator-shareholders with financial investors (eg, pension funds and insurance companies taking over divestments by oil and gas companies).

A3.4 Selected case studies: Mackenzie Valley Pipeline, Canadian oil and gas market

The Mackenzie Valley Gas Project is a proposed natural gas pipeline system along the Mackenzie Valley of Canada’s Northwest Territories, which is expected to connect northern onshore gas fields with North American markets. After early attempts in the 1970s at promoting the investment (an initiative that was shelved due to the difficulties in securing construction rights from relevant regulators), a revived interest by four Canadian oil and gas companies (Exxon, Total, ConocoPhillips and Imperial) led to new rounds of consultations in the early 2000s, and, more recently, to the attainment of regulatory approval for the project.

The Mackenzie Valley Gas Project resembles the NetCo project insofar as it represents an example of a large-scale investment requiring payment of a significant upfront cost by co-investors. In addition, just as in the NetCo model, this pipeline project entailed considerable involvement by all stakeholders in the pre-development phase (which proved necessary in order to gather sufficient consensus around the investment) and multiple rounds of consultations with national regulators. Finally, given the high demand uncertainty associated with the project, the Mackenzie Valley investment required its participants to design appropriate mechanisms to secure pre-commitments from downstream market operators. In particular, the organisation of an open-season process, together with the many associated documents that were disclosed to the general public, makes the Mackenzie Valley Gas Project particularly insightful for the design of the NetCo model.

¹³⁵ Ministry of Petroleum and Energy (2008), ‘Gas Infrastructure’, May 5th, available at: <http://www.regjeringen.no/mobil/en/dep/oed/Subject/Oil-and-Gas/gas-infrastructure.html?id=444290>.

Publicly available documents contain a detailed description of the open-season process that was set up to determine demand pre-commitments. This process in this case appears to exhibit several elements of flexibility that could be applicable for implementing the NetCo co-investment.

On the financing side, great freedom was given to individual co-investors, who could choose the optimal debt–equity split underlying their own stake. Also, through contractual options to adjust capacity pre-commitments and to terminate contracts, demand uncertainty was distributed across both co-investors and other operators in the downstream market.

Finally, the Mackenzie project appears relevant to the NetCo model because of the measures that were enacted to provide sufficient protection to minority stakeholders, such as a higher quorum for expansion decisions (ie, 50%, representing at least two of the co-investors), the absence of an obligation to participate in major improvements, and the need to secure authorisation to undertake expansions that might adversely affect the capacity entitlement of one of the co-investors.

A3.5 Selected case studies: liberalisation of UK offshore wind transmission links

In an effort to attain the objectives set out for the development of the UK renewable energy sector, a consultation was initiated between the UK government and Ofgem. According to the ensuing regime, offshore electricity transmission licences in Great Britain started being granted by way of a competitive tender process, with the successful bidder becoming the Offshore Transmission Owner (OFTO). Ofgem was designated as the body in charge of running these tenders. The licences convey specific rights and duties on OFTOs, including the right to a regulated revenue stream for an initial period of 20 years in return for the provision of transmission services.

This initiative seem to be of great relevance to the NetCo project since eight of the nine transmission links tendered to date were acquired by consortia of enterprises,¹³⁶ resulting in frequent situations of joint ownership of transmission assets (either of completed assets or of assets under construction). Even though the tenders did not usually involve large upfront payment and no winning consortium comprised downstream operators (ie, owners of offshore wind farms), the Ofgem tenders still present features that could inform the NetCo scheme. For instance, Ofgem's decision to grant a pre-set 20-year revenue stream to winning consortia—regardless of the effective utilisation of the transmission links¹³⁷—represents a valid precedent of a situation in which pre-commitments played a key role in the financing of a co-investment project.

Also, the payment—by winning consortia—of a transfer value to prior owners of the transmission links yields important messages about what constitutes a 'fair' level of remuneration for the incumbents' assets. On that specific occasion, the magnitude of the transfer value was determined by assessing the economic and efficient costs undertaken by the original developers to construct the transmission assets.

A3.6 Selected case studies: Atlantic Wind Connection, US energy sector

A final case study which seems to be particularly useful in terms of informing the financing of the NetCo investment is that of the Atlantic Wind Connection, a joint venture set up to develop an offshore wind transmission system off the east coast of the USA, starting in 2013. The joint venture comprises companies that do not hold stakes in the downstream market of offshore wind farms. In this respect, the case study seems relevant, in that it

¹³⁶ Source: Ofgem's website and Oxera analysis.

¹³⁷ Ofgem (2009), 'UK Offshore Transmission: Investment Opportunity', July, p. 5.

exemplifies how holding stakes in co-investment ventures in upstream markets may be attractive for purely financial investors. This point clearly emerges from Google's explanation of the reasons for taking part in this investment outside of its core business area:

We're willing to take calculated risks on early stage ideas and projects that can have dramatic impacts while offering attractive returns.¹³⁸

A main critique of this project was that it did not address one of the key issues hindering investment in offshore wind transmission links; namely, the need to introduce requirements on utilities to purchase a certain percentage of their electricity from renewable sources such as wind.¹³⁹

¹³⁸ Needham, R. (2010), 'The wind cries transmission', Official Google Blog, October 11th, available at: <http://googleblog.blogspot.com/2010/10/wind-cries-transmission.html>.

¹³⁹ See, for example, Malone, S. (2011), 'Google joins \$5 billion U.S. offshore wind grid project', October 12th, available at: <http://www.reuters.com/article/2010/10/12/us-marubeni-google-idUSTRE69B0ZA20101012>.

A4 Entry and exit

A4.1 Lessons from selected case studies

Under the proposed model, different participants in NetCo will wish to use its services in amounts that will vary through time (particularly as NetCo rolls out its network footprint) and as participants are more or less successful in the retail market (ie, the market in which they compete, and for which NetCo's output is an input). It might therefore be appropriate to design a framework that disciplines entry to and exit from the venture and that possibly rewards early participation.

Surveying case studies from the UK energy sector, several examples of entry and exit mechanisms were found. For instance, entry into the CUSC is a 'code'-based procedure which crucially depends on an assessment of the role and position of the entrant with respect to the electricity transmission system and the possession of specific licences (generating, distribution).

With reference to pipeline development projects, third-party access, while considered important, tends to be restricted to spare capacity (eg, as is the case in the Gassled Pipeline system).¹⁴⁰ Only seldom is a pre-set portion of capacity reserved for third-party users (eg, Nabucco Pipeline).¹⁴¹ To allow third parties to operate, secondary markets for capacity were set up in some of the case studies (eg, Gassled).

In particular, a mechanism that could be used to regulate subsequent entry into the NGA investment scheme may be modelled on the auction mechanism that regulates access to the National Grid in the UK.¹⁴² Indeed, the operator of the national electricity transmission system (the National Grid Group, NGG) has an obligation to auction an amount of capacity equal to the maximum physical capacity of the network. This capacity is offered on long- and short-term auctions, according to a predetermined allocation system (80% of capacity is offered in the form of long-term contracts). To further strengthen investment incentives, two schemes have been set up:

- NGG retains additional revenues on sales of any incremental capacity (with a 12.25% cap on real returns);
- if NGG does not manage to offer a pre-specified level of capacity, NGG has an option to buy back capacity from bidders that secured such capacity on long- or short-term auctions. This helps NGG trade off the costs of investments in new capacity and buy-back costs.

¹⁴⁰ See Wesenberg, J. and Dyrland, S. (2009), 'Norway', p. 3. Available at: http://www.kluge.no/arch/_img/9080987.pdf.

¹⁴¹ See Nabucco Pipeline, 'Capacity Trading', available at: http://www.nabucco-pipeline.com/portal/page/portal/en/commercial/capacity_trading.

¹⁴² See Ofgem (2006), 'Adjusting National Grid's Revenue Allowances when Large New-Entry Points Connect to the Gas Transmission System', March 29th.

A5 Transition

A5.1 Lessons from selected case studies

As discussed above, the participation of incumbent operators is essential to the functioning of NetCo. Consequently, it is important to provide sufficient incentives to the incumbents during the transition phase (ie, the portion of the development phase terminating with the completion of the fibre-cable roll-out). In particular, prior deployment of fibre-cable connections by incumbent operators means that NetCo's investors would need to devise some form of scheme to entice the incumbent and encourage it to transfer these existing assets to NetCo.

The net benefits of divesting certain assets and/or changing the asset intensity appear to be backed by several case studies from the both telecoms and other non-telecoms sectors. Clearly, the financial incentives depend on the (discounted) cash flows achieved through such a restructuring.

A5.2 Selected case studies: telecoms sector

The telecoms sector offers examples of the types of solutions that have been witnessed in separation models.

- The problem of customers migrating from the incumbent's existing network to the co-owned network was present in a recent case of structural separation in Australia. The incumbent, Telstra, was paid \$A9 billion by a structurally separated NBN Co for decommissioning and migrating services to the new network.¹⁴³ The deal included access to fit-for-use infrastructure such as pits, conduits and ducts, as well as the right to acquire backhaul services and exchange space.
- In the structural separation process undertaken in New Zealand, the problem associated with the duplication of assets had to be resolved by forcing the network operator (Chorus 2) to share assets with the retail operator (ServCo) under an arm's-length agreement. An independent monitoring entity was also set up to ensure that this arrangement would not harm ServCo's market position.¹⁴⁴

A5.3 Selected case studies: other sectors

Other sectors offer examples of situations where an incumbent infrastructure owner has found divestiture of certain network assets, or co-ownership of these assets, appealing, and the transactions have been successfully cleared.

- The recent sale of a 75% stake by Amprion GmbH, a German company operating an electricity transmission system, enabled the divestor to raise the funds required in order to finance upcoming investments and to reduce its net debt.¹⁴⁵

¹⁴³ See NBN Co Limited (2011), 'NBN Co and Telstra Sign Binding Definitive Agreements', press release, June 23rd, p. 1.

¹⁴⁴ For further details, see, for example, Ministry of Economic Development (2008), 'Telecom Separation a Fact – Minister for Communications and Information Technology media statement', press release, March 31st.

¹⁴⁵ RWE (2011), 'RWE sells majority shareholding in German transmission systems operator Amprion', press release, July 14th.

- Another example is the transfer of an 80% stake in Dragon LNG by 4Gas to a group of partners co-investing in the Milford Haven gas terminal. On that occasion, 4Gas realised a profit of approximately £45m–£50m in the transaction.¹⁴⁶
- Lastly, the recent exit of Shell from Gassled represented an attempt by the divestor to exit non-strategic assets and focus on major growth projects.¹⁴⁷

In addition, a valid example of the type of remuneration that can be granted to an incumbent for transferring its assets is contained in the Ofgem tenders case study described above.

¹⁴⁶ See Euronext (2004), 'Petroplus and partners in Dragon LNG sign agreements to trigger go-ahead for Milford Haven importation terminal', December 1st, press release. Available at: <http://www.euronext.com/news/companypressrelease/companypressrelease-1721-EN.html?docid=89678>.

¹⁴⁷ Euronext (2011), 'Shell sells stake in gas transport system to Infragas Norge AS', September 1st, press release, available at <http://www.euronext.com/fic/000/066/445/664455.pdf>.

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