



European PPP Expertise Centre • European PPP Expertise Centre

Broadband

Delivering next generation access through PPP

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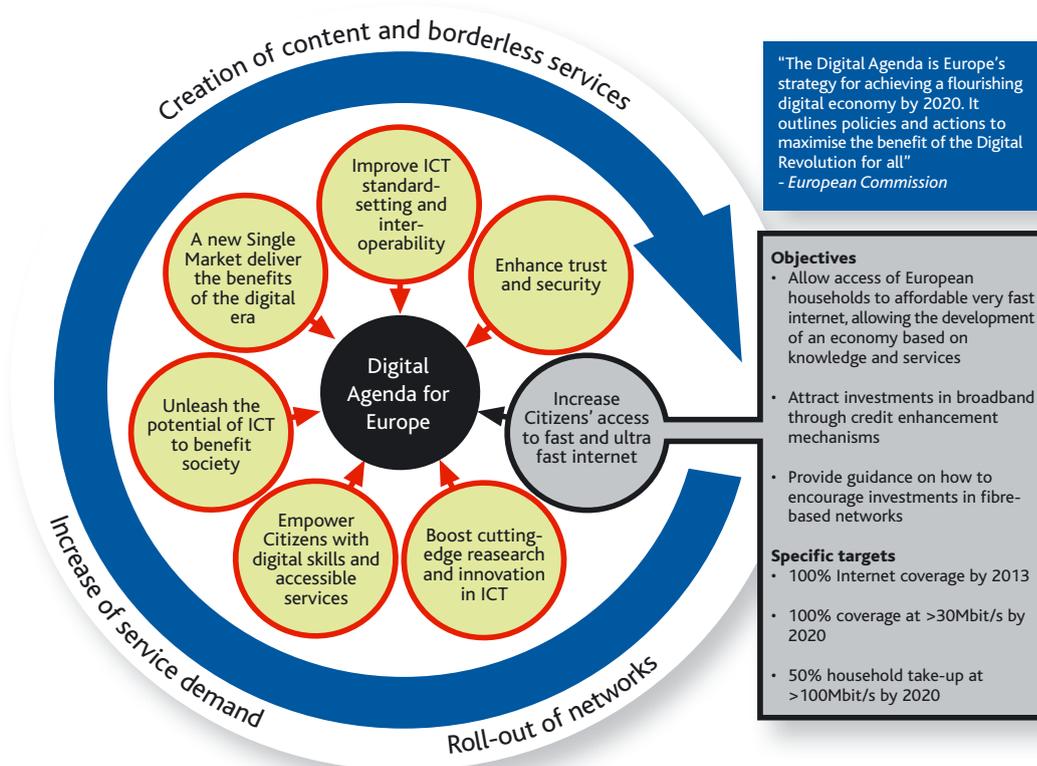
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1. Introduction

Next Generation Access for Internet Broadband

In a little over 20 years, the use of the Internet has become ubiquitous. Access to the Internet at increasingly higher connection speeds, is assuming a key role in guaranteeing both economic prosperity as well as social cohesion. The European Commission ("EC") has therefore set out an ambitious programme for increasing the accessibility of Internet provision in Europe under its Next Generation Access ("NGA"), a programme with ambitious roll-out targets that include improving download speeds so that all EU citizens will have Internet access at 30 Megabits per second ("Mbps") by the year 2020 and that 50% of households will have the ability to access the Internet at speeds of 100 Mbps or more. NGA will be key to the development of a European economy that is smart, sustainable and inclusive.

1.1 Delivering Next Generation Access through PPPs



EPEC has worked with colleagues in the EIB, and EC member states to investigate when and why Public Private Partnerships (PPPs) are an option for delivering NGA networks. This report, produced with the assistance of Analysys Mason, consolidates knowledge of existing PPP schemes in deploying NGA networks. This report provides:

- a background to the objectives of the Digital Agenda for Europe and possible investment models that could be adopted in deploying NGA infrastructure through PPPs;

- case studies of each project developed by the public sector addressing, *inter alia*, finance and ownership, legal status, cost issues, network architecture, services and competition, with an overview section including a description of the distinguishing features of each project and a final section providing a project summary and the lessons learnt; and
- conclusions that highlight the key issues raised by the case studies.

The case studies have been largely drawn from an EPEC organised workshop “*When and why PPPs are an option for Next Generation Access*” held in Rome on 15th February 2011. 65 delegates represented both the public and private sector. The event was hosted by UTFP, the Italian PPP unit and supported by DG Info.

1.2 Meeting the Digital Agenda objectives

The need for partnership between the public and private sectors

The NGA objective of national high-speed broadband coverage across the EU is ambitious. In the past, attempts to stimulate greater provision through changes in regulation, for example local loop unbundling, have been only partly successful in extending coverage nationwide. Despite a number of wide ranging initiatives, Europe is experiencing increasing disparities of access to the Internet and has consistently lagged behind leaders in connectivity such as South Korea and Japan.

Changes in the underlying telecommunication technologies present both opportunities as well as further challenges. The veritable explosion in mobile digital data over the past 5-10 years is opening up a range of new options using 4G technologies such as LTE (“Long Term Evolution”) and WiMax (“Worldwide Interoperability for Microwave Access”). These have the potential to deliver speeds of 100 mbits/s and sometimes even more. They could in principle be used in combination to deliver the most cost effective solution, avoiding the prohibitive costs associated with universal FTTH/FTTP access. This also compares favourably with xDSL technology which is limited to line speeds of up to 24 mbit/s. Nevertheless, these advanced technologies also require substantial investments simply to make them available in the more accessible, densely populated urban regions. This creates the danger that the funds that will be required will ‘crowd out’ badly needed regional funding for NGA.

Meeting the NGA objective will require private investment combined with European, national and local government support, which may include using loans from organisations such as the EIB. There are four high-level investment PPP models for NGA networks, all of which are available to the public sector for funding network deployment to meet the Digital Agenda objectives:

- private design, build and operate (“private DBO”);
- public outsourcing;
- joint venture; and
- public design, build and operate (“public DBO”).

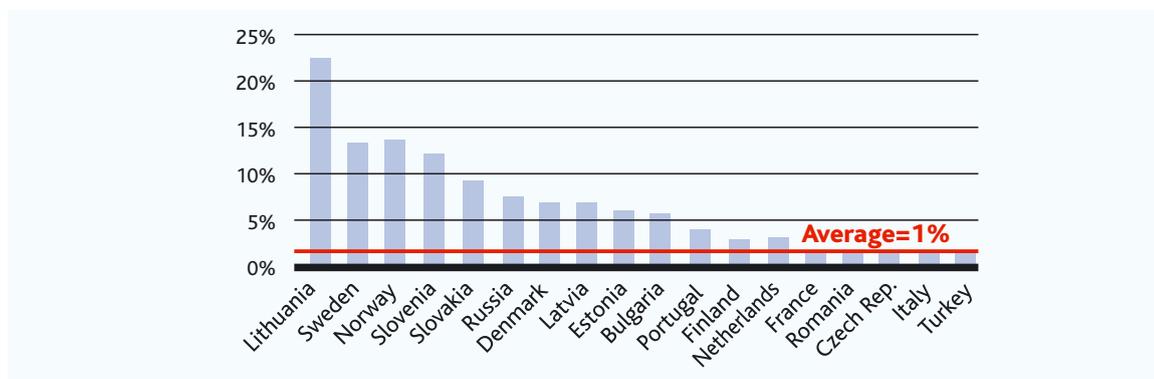
These models represent a range of options for combining public and private investment, and offer differing levels of involvement, commitment and retained risk by the public sector. Each model is applicable in different circumstances, depending on the scope of the required infrastructure, the specific aims of the public sector, and the investment/risk appetite of potential private sector partners.

2. Meeting Digital Agenda objectives through Public Private Partnerships

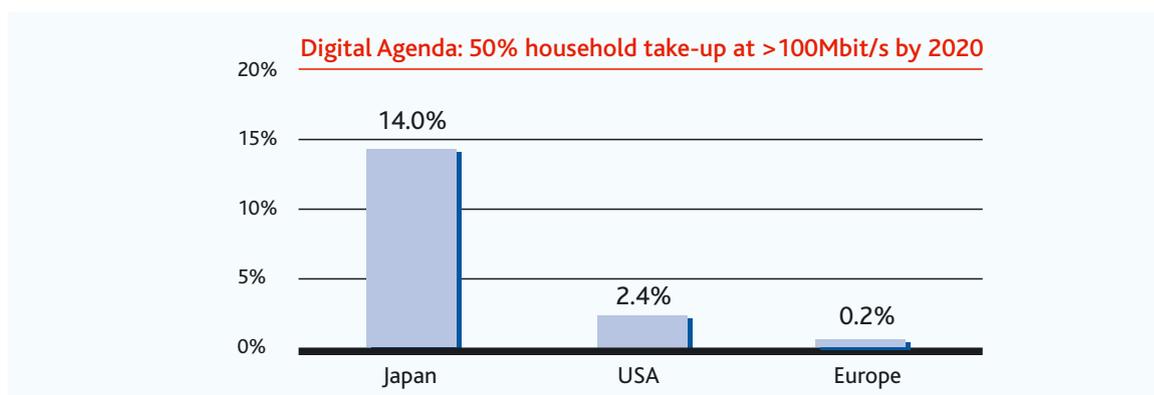
2.1 Challenges with the deployment of NGA in Europe

Meeting the NGA targets will be very challenging. The availability of services over fibre-optic connections for the Internet have been significantly lower in Europe compared to the USA and Japan. Few Europeans enjoy the Internet access speeds that the citizens of South Korea and Japan already consider to be the norm. Europe remains dependent on current ADSL (“asymmetric digital subscriber line”) and DSL (“digital subscriber line”) broadband connections based on the existing copper network infrastructure. In order to achieve the very high access rates that are envisaged under NGA, it will be necessary to develop high-speed networks based on fibre optics and combine these where appropriate with high-speed wireless connectivity. However, based on the most recent statistics available from the EC, only 42.2% of fixed broadband lines were at least 10 Mbits while 6.5% were provided up to 30 Mbps. Although some progress in improving access speeds is occurring, less than 1% of the population have access to the 100 Mbps standard that is targeted for half of the EU’s citizens by 2020. There will be significant challenges to overcome.

Proportions² of households covered by FTTH/FTTB in 2010



Penetration³ rate of FTTH/FTTB subscribers in 2010



1 Only countries with at least 1% of households that are FTTH/B subscribers are shown.
 2 FTTC can also be considered NGA since it can provide speeds of up to 30–50Mbit/s.
 3 % of subscribers out of total homes passed Source: FTTH Council, Analysys Mason.

2.2 Case studies for all four PPP funding mechanisms

While internet access in urban areas will be primarily financed and funded by the private sector, there are considerably greater challenges in extending coverage to less populated rural areas. Governments are constrained by the twin challenges of reducing deficits and meeting a number of competing demands placed on the public purse. It becomes increasingly unlikely that public authorities will be able to meet any gaps in provision on their own. Public-private partnerships ("PPPs") provide potentially effective solutions to this dilemma. As an alternative method of procurement, PPPs have been successfully applied to meet a range of infrastructure requirements. PPPs have been used to build a range of transport infrastructure projects but they have been equally successfully employed for building schools, hospitals, law courts, prisons, sports facilities as well as other forms of accommodation required by the public sector.

PPPs should not be simply seen as a method of financing. They can provide the public sector with the ability to transfer risk and accelerate the roll out of the necessary infrastructure which service providers require to be in place before they are willing to provide broadband services for retail and business customers. PPPs have the advantage that the level of private sector involvement and funding commitment can be tailored to meet the specific requirements that exist for a particular region. There is not necessarily a single size that fits all. The level of control that needs to be retained by the public sector will vary. PPPs make it possible to implement projects with the appropriate scope and accelerated time scales, ensuring public funds will be used in the most effective and efficient manner while encouraging as much private sector involvement and especially risk sharing as possible. In the examples described PPPs take various forms and use a variety of funding models. In each case, the project varies in the level of risk transfer and financial contribution from the private sector.

The seven case studies described in this report demonstrate how different PPP models can be used.

Project	Private DBO	Public outsourcing	Joint venture	Public DBO
Superfast Cornwall, UK				
Asturcon, Spain				
Metroweb, Italy				
Auvergne, France				
Progetto Lombardia, Italy				
MAN Project, Ireland				
Shetland Interconnect Project, UK				

2.3 Four PPP models for Broadband Internet Infrastructure

The principal basis for comparing the different models is to consider the respective decision rights shared between the public and the private sector. However, the key feature that they have in common, is that the public sector arranges the infrastructure that is necessary before private service providers will be prepared to deliver broadband services. Once committed, services made available include telephony and cable TV services, in addition to Internet broadband. While the approaches differ, each approach has enjoyed its measure of success and has attracted sufficient private sector interest. In addition, a key recurring benefit has been the effective transition from copper based networks to a high capacity fibre-optic network.

The four key PPP 'archetypes' that have been identified as a result of the research are as follows:

Private DBO

There will be many regions in Europe where the demand for broadband is sufficient to attract the private sector but where additional financial support is required in the form of public grants in order to create an acceptable investment case. Under this form of PPP, the private sector builds, owns and operates the infrastructure but is subject to strict controls, including the setting of roll-out targets, benchmarking as well as other clearly defined targets.

Superfast Cornwall is a project in the United Kingdom which demonstrates how this model can be applied. BT won a public tender to provide fast fibre optic based broadband services to more than 266,000 premises including 30,000 businesses in the County of Cornwall. An amount of GBP 132 million will be invested in providing the network infrastructure which will then be available to third party service providers on a wholesale basis. The European Regional Development Fund ("ERDF") is supporting the project with GBP 53.5 million of funding. BT is providing the balance giving it strong financial incentives to ensure that not only is the broadband network constructed to the required standards but that take-up of services by various private service providers is achieved.

PPP Joint-Venture

A PPP joint venture ("JV") involves a split in ownership between the public and private sectors. Construction and operation are undertaken by the private sector. JVs make it possible for the public sector to initiate a major part of the project but then allow the private sector to increasingly take control and responsibility based on certain key performance indicators. The public sector initially makes a larger financial commitment but the private sector then takes responsibility until the network becomes self financing.

Metroweb in Italy is an example and has successfully invested EUR 400 million in a fibre optic infrastructure that serves the greater Milan region. It was established by a municipal utility and has now evolved to position where the company is entirely privately owned. After ten successful years, self funded expansion continues. This form of PPP makes it possible to secure private sector expertise and support while the public sector retains control in the crucial early stages of network construction and continues to have decision rights when commercial operations have been demonstrated.

Public Outsourcing / GOCO

A third approach is based on the 'Government Owned – Contractor Operated' ("GOCO") PPP model. This type of contract has been used successfully in the UK and USA for politically sensitive infrastructure, for example Government laboratories operated by the private sector. It involves the construction and operation of a fully functional broadband infrastructure where the funding itself is being provided from public sector sources. The private sector operator is appointed after a competitive tender and takes responsibility for implementing the infrastructure and subsequently operating the network. In addition, the private company also has responsibility for marketing wholesale and, in certain cases, retail services.

The Metropolitan Networks Project ("MAN") in Ireland and a PPP in the Auvergne region in France represent examples. The individual MANs are managed by e|net for a period of 15 years. Collectively, they have a network of over 1,000 km of fibre-optic capacity throughout 66 towns in Ireland. Total investment is up to EUR 170 million with local and regional authorities providing 10%, ERDF 45% and the balance funded by the Irish Government. The infrastructure remains in State ownership. In the Auvergne project, France Telecom has a 10-year contract to operate and extend the existing broadband network budgeted to cost EUR 38.5 million. While principally based on DSL, the network incorporates fibre-optic loops that increase download speeds. In both projects, major service providers have been attracted to provide services to customers.

Public DBO

In this model there is a significantly higher level of involvement by the public sector that is justified by the greater control that is being sought. In particular, this model offers an alternative when special funding for deprived regions is available. The public sector develops the required infrastructure for broadband services in a conventional way by letting contracts individually. The design, implementation and operation of the network itself are all directly managed by the public sector. A separate publicly owned company is established that makes the network available to private service providers on a competitive basis.

An example of this structure is the Asturcon PPP in Spain which is implementing and managing the wholesale network itself (EUR 55 million invested) in order to keep control of its roll-out objectives and to manage the network directly. The Asturcon project operates in a declining former coal and steel producing region of Spain. A wholly public owned, special purpose company has been established (GIT), that offers wholesale services to private service providers. The high level of control has permitted a range of competing private service providers to get involved. Services to business and residents include 100/100 Mbps connections for business and 100/20 Mbps for residential customers.

2.4 Other key considerations

Technology selection

It is becoming more and more apparent that it is not financially viable to implement FTTP (“fibre to the premises”) solutions across all areas. In the projects we have examined, Superfast Cornwall and Auvergne have acknowledged that it is unrealistic to implement FTTP across the whole target area as its costs are economically prohibitive. Instead there is a focus on providing a significantly faster service than is currently available. While this is not ideal, it will still provide benefit within the constraints of the economic environment. New technological alternatives offered by 4G may overcome some of the current financial obstacles. As the demand for access to digital data continues to increase exponentially, any step increase in download speeds in remote regions is very welcome, even where it still compares poorly with what is available in larger urban areas.

Project sustainability

From a sustainability perspective, it is positive to see that some major national operators are participating in projects (e.g. Superfast Cornwall, Auvergne, Progetto BUL Lombardia). This is particularly the case if they are involved in providing wholesale services that are an extension of the services they offer in other areas of the country. This helps to ensure that customers have access to a wide range of products and services, and gives them access to the best deals in the national market.

Project risk

A key issue in all projects is the allocation of commercial and technical risk. When the private sector is involved, it is important to share the risk as much as possible, but this needs to be realistic to ensure that private investment is secured.

In the case of outsourcing, where the managed service entity makes some investment (e.g. in active equipment), steps need to be taken to ensure that investment can be encouraged throughout the lifetime of the outsourcing contract, rather than investment tailing off due to a lack of opportunity for a return on investment.

PPP has an important part to play if Europe is to meet its 2020 Digital Agenda objectives as neither public or private sector investment alone is going to deliver success. Moreover, PPPs should be used to ensure that public funds are distributed as fairly as possible and only used where the private sector is unable to provide a solution. In addition, PPPs provide a good vehicle for delivering effective governance to ensure that public objectives are met.

2.5 Initiatives to stimulate demand

All seven projects have utilised a number of approaches to stimulate demand. These include:

<p>Direct contact with business</p>	<ul style="list-style-type: none"> • A dedicated EUR 1 million programme of engagement with businesses to promote use of the NGA network is being followed in Superfast Cornwall, using information meetings and direct contact with individual businesses. • MAN e net has also followed a demand stimulation model of direct contact, focusing on local authorities and organisations.
<p>Advertising</p>	<ul style="list-style-type: none"> • Direct advertising has been used by Asturcon and Auvergne to promote awareness of the NGA network, while Metroweb has relied on advertising by retail providers, Fastweb and Telecom Italia, directly to customers. • Local initiatives can also be supplemented by national campaigns, such as the promotion by Martha Lane Fox, the UK “Digital Champion”.
<p>Work with service providers</p>	<ul style="list-style-type: none"> • Metroweb initially targeted renting capacity to other operators on short-term leases (i.e. less than three years) to increase the use of the network. • MAN e net has worked with service providers to develop specific services to deliver over the network and Progetto Lombardia is planning to take a similar approach.
<p>Education</p>	<ul style="list-style-type: none"> • Progetto BUL Lombardia has identified the need for ICT education to establish understanding of how NGA can enhance business productivity through initiatives such as collaboration tools. • Superfast Cornwall’s business engagement will educate by highlighting opportunities enabled by the NGA network.

2.6 Comparison with other sectors

Comparison with transport projects

PPPs have been used to fund transport infrastructure construction and maintenance over the last 25 years. The approach received a major impetus in the UK in 1992 with the introduction of private finance initiatives, and has since spread to other British Commonwealth countries and the European Union.

There are a number of differences between transport PPP contracts and NGA PPPs that make the latter more difficult to implement. Demand for transport services is easier to predict as it is a mature service where growth can be relatively reliably predicted, whereas NGA is a new service with uncertain demand. The transport value chain is relatively straightforward, comprising the transport user, government, and the private company involved in the PPP. By contrast, the NGA value chain involves the more complex setting-up of retail and application providers.

NGA carries a technology risk that is not evident in the transport sector, in that the specific broadband technology chosen could be threatened by other technologies during the lifetime of the project. For example, a FTTC ("fibre to the curb") deployment could be threatened by a FTTP or wireless-based solution – the alternative technology could provide an opportunity for market entry through competition with the PPP project, threatening the business case of the PPP. Additionally, a PPP-based FTTP network could be threatened by an existing copper-based network, if copper technology improves sufficiently to provide a higher access speed and a longer life – this could reduce the take-up of the new network.

2.7 Encouraging innovation and a wide range of service providers

Open and flexible model

The network must be open and flexible to enable innovation by service providers at price levels that are competitive and fair, and that discourage the establishment of alternative infrastructure. This will encourage potential competing providers to become wholesale customers of the PPP-developed network rather than setting up a separate network.

The threat from the copper network can be mitigated by incorporating the closure of the existing copper infrastructure as part of the PPP project, as in Progetto Lombardia. There are complications, as the PPP will need to ensure that regulatory conditions supporting existing services are met, and it requires the participation of the incumbent operator. However, this approach provides more certainty that customers will migrate to the new network.

Wholesale access provider model

The entity that sells access to the NGA network can be a pure wholesale access provider or the wholesale arm of an operator that also provides retail services. If the wholesale operator also has a retail arm, there must be some form of separation to ensure that conflicts of interest are avoided. These issues are addressed in the Superfast Cornwall project by the following measures:

- functional separation of BT's Openreach access business from its wholesale and retail arms;
- regulation of pricing and access to services by the UK regulator, Ofcom; and
- account separation of the Superfast Cornwall project by BT.

A wholesale-only operator does not have such issues, but may have other difficulties such as:

- establishing pricing levels if there is no national precedent (as happened at Asturcon); or
- attracting service providers on to the network, as the network may not have the critical mass of potential customers to make interconnecting to the network worthwhile.

State aid approval

In general, approval is easier when there is private capital input into the project as it lowers the state aid intensity, which is a key measure used by the EC in assessing market distortion.

2.8 The need for a long-term view

In order to attract the level of investment required to meet Digital Agenda objectives, it will be necessary to supplement governmental and EU investment with significant private sector investment. NGA PPP projects can be particularly attractive to those investors looking for a modest but relatively secure annual return over a long period from a business with a steady cash flow, such as pension funds.

In order to attract investment from organisations looking for such return profiles, it is vital to minimise the risk by carefully designing the terms of the PPP. The experience of Metroweb suggests that reasonable returns can be achieved by building a network capability that can be used to replicate roll-out over a wider area – though it is also true that Metroweb has been built in a relatively affluent part of Italy which is commercially attractive. Metroweb has also benefited from its close relationship with the retail provider, Fastweb, which has reduced market risk. This is less likely to be the case with most PPP projects that are targeted at more underdeveloped areas.

Whenever public sector funds are used to subsidise private firms, there is the possibility that this infringes on existing EU regulations. State aid is generally undesirable since it creates market distortions. However, there may be particular situations where subsidies may be considered acceptable. In particular, providing public grants can be considered acceptable if it will enable rapid development in underserved regions, like Cornwall and the Shetland Isles.

State aid for a NGA roll-out may be allowed if it will significantly accelerate deployment compared with leaving it to the free market. However, as Superfast Cornwall and Shetland illustrate, the state aid application and procurement process does take a considerable time – typically, 2-3 years.

The speed of network roll-out once the funds and contractors are in place depends on a number of factors, including the impact of time on the availability of funds to build the NGA and the size and complexity of the project and their impact on the roll-out plan:

- for Superfast Cornwall, ERDF funds are only available up to 2014 under the Cornwall Convergence programme; and
- Auvergne is phasing its NGA roll-out over 12 years to spread the investment requirements over a significant period of time.

3. Superfast Cornwall

3.1 Scope and objectives

Announced in September 2010, Superfast Cornwall plans to bring superfast next generation broadband (FTTP and FTTC) to a minimum of 80% of premises by 2015. The programme also plans to bring fibre-based faster broadband and provide an uplift to existing speeds for premises outside the fibre footprint.

The investment is part of the European Union Convergence programme, which aims to help transform the economic competitiveness of Cornwall and the Isles of Scilly.

Funding mechanism

Superfast Cornwall is an example of Private DBO. It leverages the resources and expertise of an established operator (BT) to deliver a large and complex project.

3.2 Key characteristics

Characteristic	Description
Distinguishing features	Private design, build and operate with a public grant, aiming for high level of FTTP
Ownership	BT (funded by ERDF grant, BT and Cornwall Council)
Wholesale	Active wholesale products via BT Wholesale and Openreach plus passive access in line with UK regulatory requirements
Legal status	State aid provided, based on Cornwall being a predominantly white area (i.e. an area of land for which no specific planning proposal has been adopted)
Costs	Overall budget estimated at GBP132 million

Coverage area

Superfast broadband starts to become available

- Now
- March 2012
- End-2012
- End-2013

- Environment: predominantly rural
- Premises: 266 000 including 25 000 businesses (over 80% FTTP and FTTC)
- Progress to date (April 2011): 15 000 premises passed in 8 exchange areas (FTTC)

Source: Cornwall Development Company

3.3 Finance and ownership

Investment

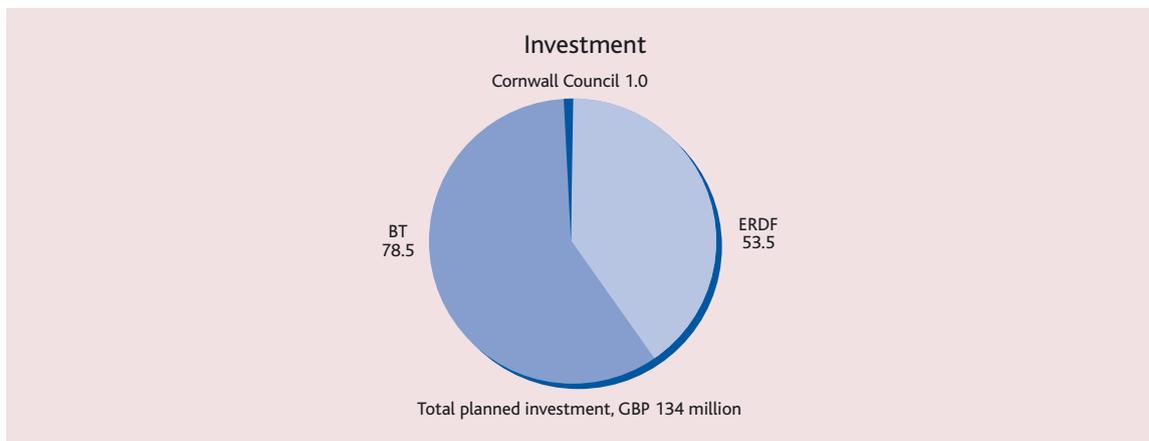
BT Group (incorporating BT Wholesale, Openreach and its retail businesses) will invest up to GBP 78.5 million, funded from their balance sheet, and the ERDF will provide up to GBP 53.5 million of gap funding to make up the total planned project costs. Cornwall Council is investing jointly in marketing along with ERDF and BT to stimulate demand.

Reasons for approach

Next generation broadband ("NGB") was identified as the single most transformational element of the European Union Convergence programme for Cornwall and Isles of Scilly 2007-13.

The development of both public sector and private sector led PPP options were considered. The public sector led option was rejected as the risks would have been carried entirely by the public sector and a significant opportunity to leverage private sector investment would have been missed.

The recommended PPP approach was for the private sector to build, own and operate the NGB network with the emphasis placed on delivering economic benefits and with 100% coverage as an aspiration. This approach is also seen as a basis for securing future investment to sustain the NGB network.



3.4 Legal status

A state aid application was submitted in July 2009 in accordance with Article 88(3) of the EC treaty, as part of the EU Convergence funding programme for 2007-13. Approval was granted in May 2010.

The application argued that it was compatible with state aid requirements published in September 2009. In particular:

- Lisbon Agenda – the Lisbon categories of intervention for broadband networks and ICT infrastructure;
- European Information Society (i2010) – supporting development of comprehensive national broadband strategies;
- EU sustainable development strategy – using NGB to cut energy requirements (e.g. reducing travel);
- UK national NGB strategy – “Digital Britain” report; and
- compatibility with state aid guidelines for broadband networks which are likely to remain a NGB white area for some time, for example:
 - open access – active wholesale access on a non-discriminatory, equal and transparent basis and passive access where a demand arises and is commercially viable;
 - separate accounts are provided by BT for the project; and
 - BT receives the grant once it submits expenses demonstrating how the money has been spent.

3.5 Business approach

Procurement approach

The grant fund competition process followed a competitive dialogue procedure in accordance with the UK Public Contracts Regulations 2006, which resulted in the selection of BT.

The award criteria included:

- level of gap funding sought;
- financial model including return on investment;
- technology;
- coverage;
- regulatory fit (including active and passive wholesale access);
- implementation and support services;
- tariffs and affordability; and
- end-user applications and marketing.

Market competitiveness

Service provider layer	Open market
Active network layer	BT Wholesale
Passive infrastructure	Openreach*

BT will be offering the same active wholesale products and pricing as it is offering nationally through its Openreach and BT Wholesale divisions.

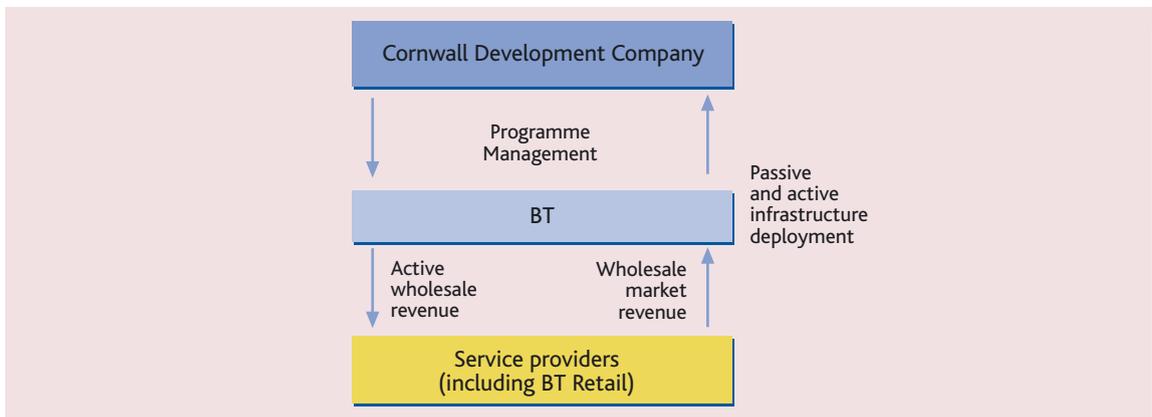
The risk of conflict of interest between retail and wholesale operations of BT is moderated as Openreach is already structurally separated.

Passive access is also likely to follow BT’s national approach, where duct and pole access is being formulated.

Demand stimulation initiatives

Cornwall Council and ERDF are investing GBP1 million in demand stimulation with additional support from BT. There is a programme of engagement with the business community, through meetings and direct contact, focused on tackling barriers and highlighting opportunities.

Management structure and business model



Until 2015, the deployment programme will be managed by Cornwall Development Company to ensure that the project objectives are met. BT will deploy active and passive wholesale services to service providers using the same interfaces and support systems as in its wider UK deployment.

The aim is to achieve 50% take-up by 2015.

* Source: http://www.culture.gov.uk/reference_library/media_releases/6220.aspx defined by the EC as areas where such networks do not at present exist and where they are not likely to be built and be fully operational in the near future (within 3 years).

3.6 Cost issues

Overall budget

The budget for the project is an amount up to GBP 134 million. The capital investment includes the following areas:

- duct laying and optical fibre (130 000 km);
- surveys and network planning;
- street cabinets, electronics and power;
- exchange based electronics and power;
- backhaul infrastructure;
- customer installation and customer premises equipment; and
- other non-fibre technologies (e.g. wireless, satellite etc.).

There will also be on-going operational expenditure including:

- programme set-up and on-going project management;
- marketing;
- service management; and
- training.

The capital investment and on-going operational expenditure required will be offset to some extent by wholesale service revenues.

Cost and risk reduction measures

The project approach addresses a number of cost and risk issues:

- **leveraging existing infrastructure** – BT already has a core and access network in Cornwall which is being used for access and backhaul elements of the network solution. This helps to minimise costs.
- **technology risk** – the BT FTTC and FTTP solutions will form part of a mainstream adoption in a national roll-out by BT. This minimises implementation risk, which is also being passed on to the private sector on a contractual basis.
- **service take-up** – the financial success of the project depends on strong service take-up to generate the revenues that sustain the initial network build-out investment and on-going network support.

Strong demand stimulation activity should help to drive take-up, which will also be driven by access to BT's existing large number of service providers, who have already invested in large scale wholesale service provisioning systems.

3.7 Network architecture, services and competition

Services

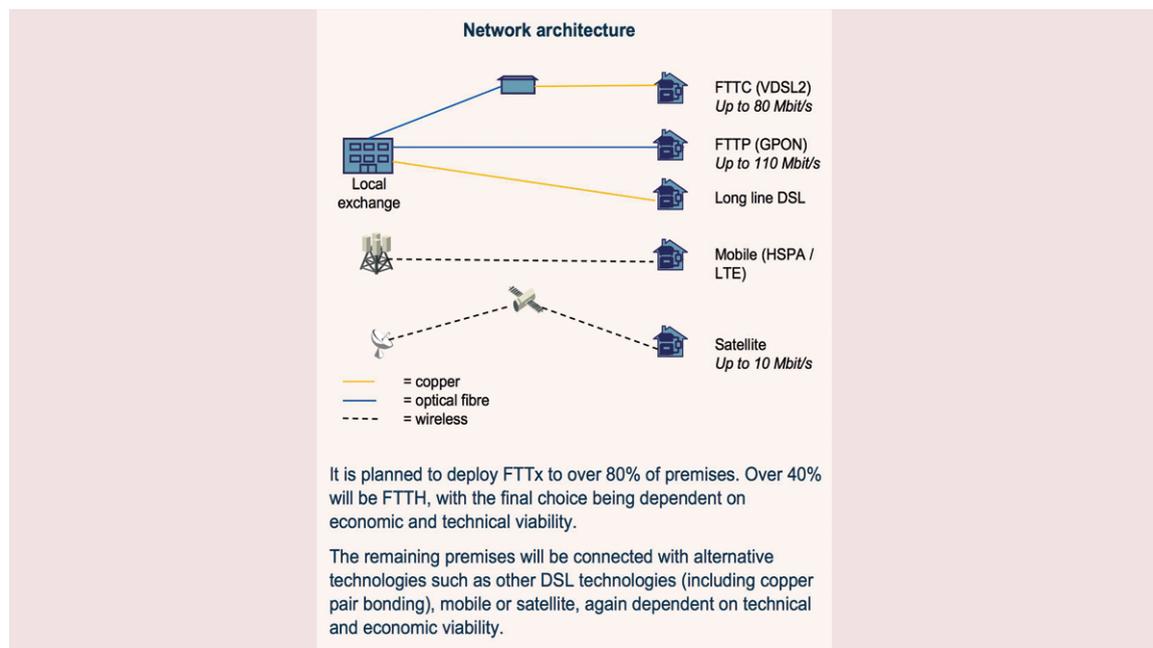
The active network wholesale services offered by BT are:

- **Generic Ethernet Access (FTTC/FTTP)** – the product that most closely provides the service flexibility of local loop unbundling, and is provided by Openreach;
- **Wholesale Broadband Connect** – a managed service with BT Wholesale actively managing the bandwidth and other elements. It is an evolution of existing broadband services; and
- **White Label Managed Service** – provides end-to-end service management for service providers.

Competition

Existing broadband services in Cornwall and Isles of Scilly are almost exclusively provided over BT's current infrastructure except for a small amount of competition from cable operator, Virgin Media, in the far east of the county.

Local loop unbundling is present at 22% of the exchanges.



3.8 Project summary and lessons learnt

Project Summary

This project is an example of a Private DBO.

This project demonstrates how public funds can be used to promote an underdeveloped area which is traditionally underserved by broadband infrastructure, to match or even exceed the national roll-out.

The next generation infrastructure is intended to underpin economic development. This is being achieved by combining private sector investment with public funds to make the project viable.

The take-up rates that the project business case depends upon are quite challenging, but demand stimulation activities are underway, demonstrating a determination to make the project a success.

In selecting BT as the network supplier, Superfast Cornwall can be sure that it has a partner fully committed to the support of superfast broadband over the long term. In addition, it can be expected that a wide range of service providers will be available to customers of the new network.

Passive wholesale access to the infrastructure is not initially available, but it can be expected that access will develop in line with UK regulatory requirements.

Lessons learnt

Deploying FTTC introduces roll-out complexities not encountered in providing broadband from the exchange. In initial roll-out areas, based on exchange boundaries, 20-30% of subscribers cannot yet access services as:

- a solution is not yet available for subscribers closest to the exchange who connect directly to the exchange and not via a roadside cabinet. VDSL2 ("Very high bit rate Digital Subscriber Line") cannot be offered from the exchange and FTTP solutions are still in development;
- some lines are too long to provide VDSL2 service even from the roadside cabinet; and
- there have been delays in upgrading certain cabinets to superfast broadband due to planning, power supply and other technical factors.

This leads to difficulties in promoting the availability of superfast broadband in an exchange area.

The project needs appropriate technical expertise as local authorities have a limited understanding of the market.

The length of time taken to achieve state aid clearance and the detailed level of information required should not be underestimated.

4. Asturcon

4.1 Scope and objectives

Asturcon is an FTTP infrastructure being rolled out to selected towns in the economically disadvantaged Principality of Asturias in Spain. The network is owned by the Principality of Asturias Government, via a company named GIT that runs the network on its behalf as a neutral operator.

Historically, Asturias has been heavily dependent on the now-declining steel and coal mining industries. The objective of the project is to promote economic activity and reduce the digital gap by implementing a public NGA network in towns designated as white areas in Asturias. The network is open to all service providers, but local service providers are promoted.

Funding mechanism

Asturcon is an example of a Public DBO. This approach has been taken in order for Asturias to retain control of its roll-out objectives and provide neutral management of the network.

4.2 Key characteristics

Characteristic	Description
Distinguishing features	100% public owned and run network in an area in need of economic regeneration, which has now attracted a national operator - Orange
Ownership	The Principality of Asturias government using regional, national and European funding
Wholesale	GIT sells open access active wholesale services to service providers.
Legal status	State aid provided as investment is targeted at white areas
Costs	EUR 55 million invested to date

Coverage area

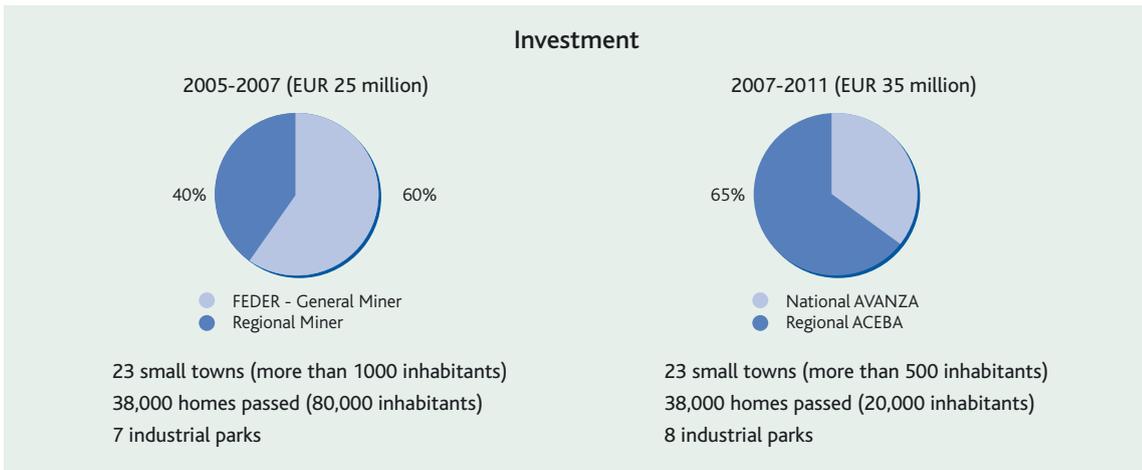


- = roll-out completed
- = roll-out in progress

- Environment: 80% Urban, 20% rural with mountainous areas
- Population: 1.1 million (490 000 homes)
- Homes passed (April 2011): 56 000 (complete)
- Customers (June 2011): 9297 (17% penetration)

Source: GIT (June 2011)

4.3 Finance and ownership



Note: FEDER is a European Union regional development fund. AVANZA is a Spanish national information services fund. ACEBA is a regional Asturias development fund. Source: GIT

Investment

The first tranche of investment for the project came from a combination of European (FEDER) and Spanish regional funds aimed at regenerating the mining community. The second tranche has come from Spanish national and regional public funds. The FEDER and AVANZA funds were accessed using loans from the EC or Spanish government, but the regional funds came directly from the balance sheet of the Asturias regional government. The Principality of Asturias owns the network which is run by its wholly-owned operating company, GIT.

Reasons for approach

The approach ensures investment in underserved areas in Asturias where commercial operators were reluctant to invest. The local government can maintain control of deployment and coordinate future investment in the region. It was considered that running the network as a wholesale operator would not be attractive to a commercial operator.

4.4 Legal status

The Asturcon project is focused on NGA deployment to white areas which are defined by the EC as areas where such networks do not at present exist and where they are not likely to be built and be fully operational in the near future (within 3 years).

The white areas identified in Asturias typically had no ADSL (“Asymmetric Digital Subscriber Line”) services, or had only services with less than 3Mbit/s download speed. No NGA network was present and no private organisations were showing any interest in building NGA infrastructure.

The focus of the Asturcon project has made it eligible for state aid, which has been granted.

The local government has officially defined the minimum bandwidth per user to be 10Mbit/s, and symmetrical 100Mbit/s services are being offered by Asturcon to operators.

4.5 Business approach

Procurement approach

Procurement has been conducted in accordance with Spanish law. The key civil works and active electronics contracts were selected by a tendering process, which was considered more transparent than competitive dialogue.

This approach has resulted in a different supplier being chosen for the second phase, the procurement of active electronic FTTP equipment. CPE (“Customer premises equipment”) is being sourced from multiple vendors, which is helping to reduce costs.

Market competitiveness

Service provider layer	Open market
Active network layer	GIT
Passive infrastructure	GIT

GIT provides access to service providers at the active layer. It acts as a neutral operator, not offering retail services of its own.

Demand stimulation initiatives

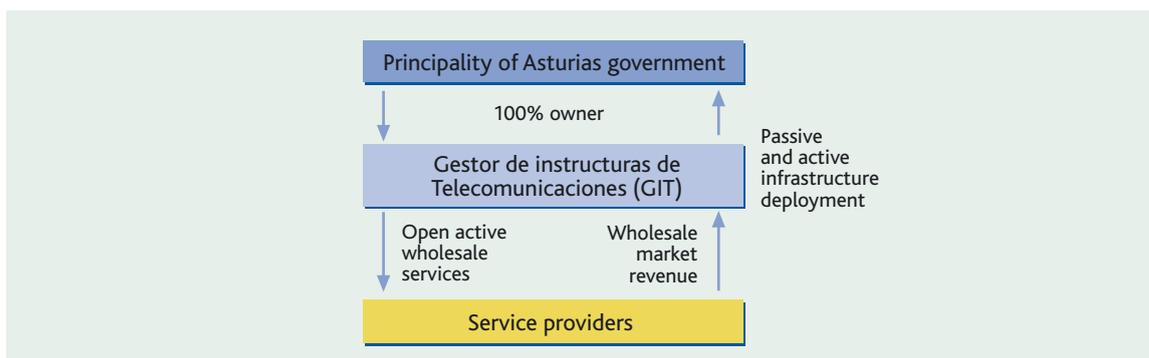
The Principality of Asturias Government is helping to encourage demand for the network services through:

- commercials in the regional press; and
- a mobile showroom travelling around the region, where users can test the network and sign a contract.

The regional government is also examining other means to boost the use of the network, including:

- promoting internet use in Asturias; and
- developing IP transport services for mobile operators.

Management structure and business model



GIT runs the network on behalf of the Asturias government and provides services to retail service providers.

GIT also has responsibility for co-ordinating telecoms projects within the region, designing future strategies and promoting high-quality telecoms infrastructure in Asturias.

4.6 Cost issues

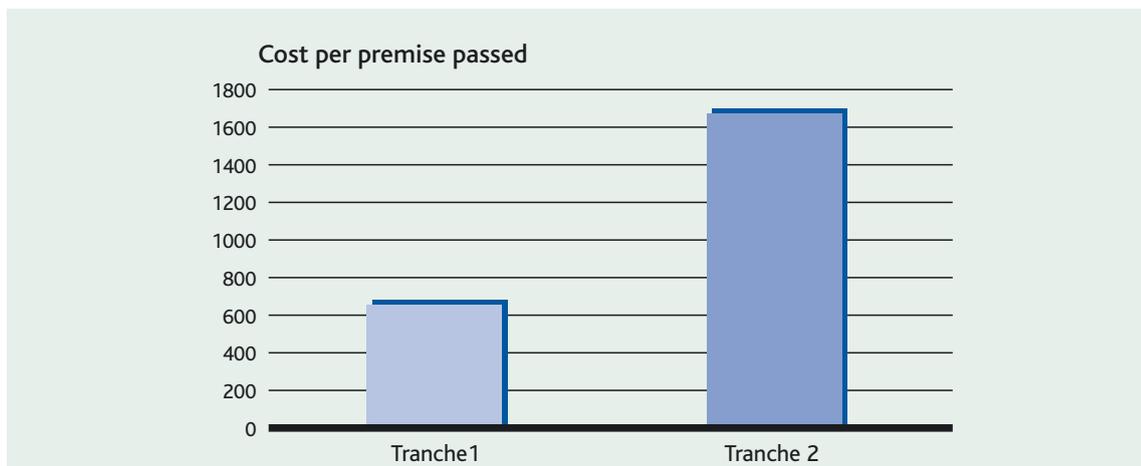
Implementation costs

The budget for the project has been split into two tranches. The first tranche of EUR 25 million funded 38,000 homes at a cost of EUR 658 per premises passed. The second tranche targeting smaller towns has been significantly more expensive (EUR 1,667), reflecting the smaller size of each town installation with less economies of scale and a lower density of housing.

Cost and risk reduction measures

The cost of deployment has been reduced significantly by the use of public infrastructure and ducts belonging to municipalities, regional government and other public companies.

In some cases PoPs ("Point of Presence") are shared between neighbouring towns targeted by the roll-out, and are typically located in properties made available by the town councils.



4.7 Network architecture, services and competition

Services

Wholesale

GIT offers active wholesale services to service providers offering symmetrical 100Mbit/s for residential users, and a range of services for businesses between 10 and 100Mbit/s. GIT is starting to offer services to the public sector, (e.g. gigabit ethernet services to the 13 hospitals in Asturias).

Wholesale gigabit ethernet interconnect is provided for data, VoIP ("Voice over internet protocol") and IPTV ("Internet protocol TV"). RF and V.5.2 for telephony are also offered.

Retail

Three service providers are active in the market:

TeleCable

Offering 40 channels of RF-over-fibre TV, voice and high-speed internet. IPTV services are also being considered. A retail package of 70Mbit/s internet, TV and telephone costs EUR 72 per month.

Adamo

Offering residential and business services. High-speed internet at 100/20Mbit/s (residential) and 100/100Mbit/s (business) and telephony including VoIP IP PBX and SIP trunking services for businesses. Residential internet plus telephony service costs EUR 35.

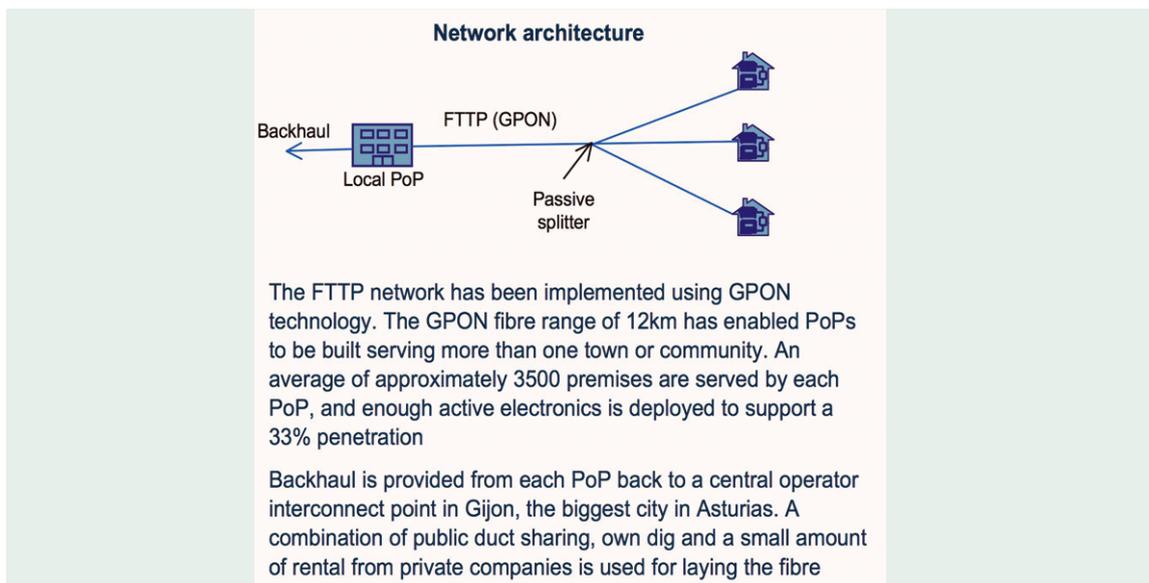
Orange

Orange is about to begin offering services as the first nationwide operator on the network, offering a package of 60 channels of IPTV, 100/100 Mbit/s high-speed internet and telephony for EUR 45.

Nostracom ceased offering services on 4 July 2011. Its customer have been taken on by Adamo.

Competition

The project is intentionally limited to cities in the region with very low levels of broadband competition. Only the incumbent, Telefónica, offers ADSL services and LLU ("Local loop unbundling") is rare. Cable penetration is quite high in Asturias, but limited to more populated regions outside the scope of the Asturcon network.



4.8 Project summary and lessons learnt

Project Summary

Asturcon is an example of a Public DBO.

The project has brought NGN services to 56,000 premises in 46 villages and 15 industrial parks, and so far has achieved 17% penetration. In addition, the network is also starting to provide services to regional government.

The recent attraction of the national operator Orange onto the network is likely to provide further impetus to service take-up, and provides competition where previously only Telefónica was offering services. Given the characteristics of the area, it is evident that this would not have happened without public sector intervention.

The key characteristic of the project is that local government has taken responsibility for building the network and providing wholesale services without outsourcing to the private sector. This approach was adopted as it was considered that the areas to be covered would not be attractive to a private operator. The project demonstrates that a successful NGA implementation in the public sector is possible.

There are currently no plans to sell the operations to a private operator in the future.

Lessons learnt

- During set-up it was important to build a primary interconnection node at a location convenient for operators to interconnect;
- It is possible to increase the efficiency of the use of electronics through more efficient network design leading to operating expenditure savings;
- Agreements with local governments are needed to minimise the cost of deployment, including obtaining licences and civil works access;
- In the initial absence of Telefónica's wholesale price list for broadband, it was difficult to find the right level to set wholesale broadband prices; and
- As the first neutral public and bitstream operator in Spain, a lot of technical new ground was covered. In general, it has become apparent that there is not one solution for all cases and that each case must be studied independently. The project has shown that even in different parts of Asturias the same kind of deployment may not work in all cases.

5. Metroweb

5.1 Scope and objectives

In 1998, the local gas and electricity utility company, A2A* established a PPP with e.Biscom, a new telecom service provider, with the objective of accelerating the roll-out of a large metropolitan access network. The rapid growth of e.Biscom led to the business specialisation and eventually the complete separation between infrastructure (Metroweb) and services (Fastweb).

Metroweb now operates a 2700km metropolitan and access network. Its infrastructure extends over almost the whole municipality of Milan (covering both sides of the streets) as well as the hinterland and selected backbone routes throughout Northern Italy. The company wholesales its fibre to telecom operators that offer services to end customers.

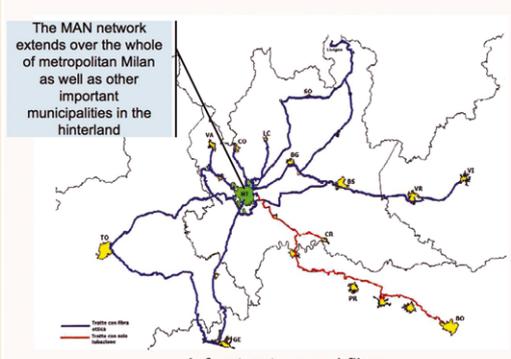
Funding mechanism

Metroweb is an example of a joint venture, where the ownership of the network is split between the public and private sectors by setting up a special purpose vehicle ("SPV").

5.2 Key characteristics

Characteristic	Description
Distinguishing features	The initial PPP terms allowed the development of a social utility for almost exclusive use by Fastweb, which has now attracted Telecom Italia.
Ownership	Recently taken over by F2i and Intesa Sanpaolo, previously part-owned by A2A (a publicly owned electricity company)
Wholesale	Leases point-to-point, dark-fibre services
Legal status	No state aid funding has been approved
Costs	Approximately EUR 400 million invested to date

The MAN network extends over the whole of metropolitan Milan as well as other important municipalities in the hinterland

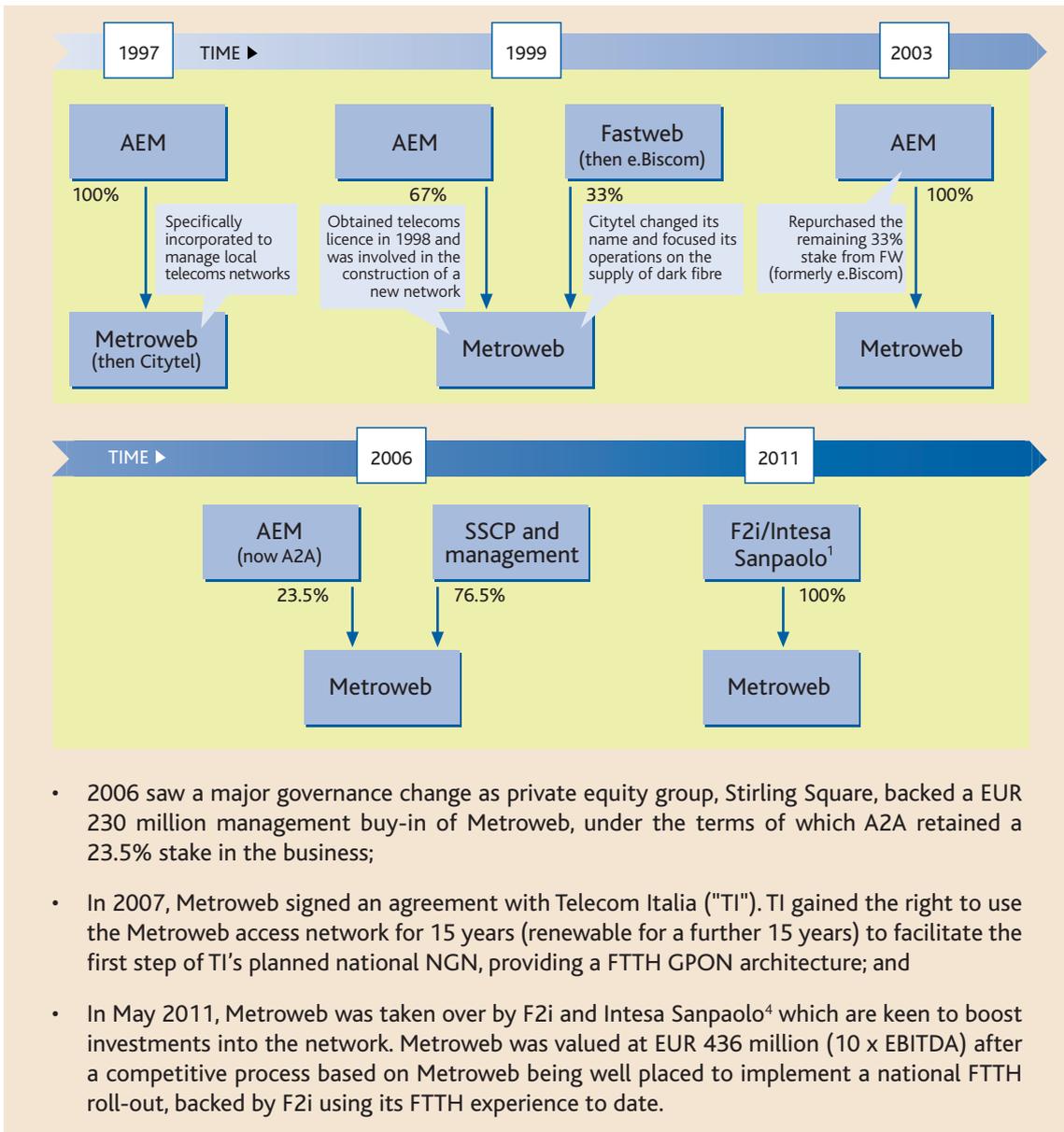


— Infrastructure and fibre
— Infrastructure ducts only

- Environment: predominately in metropolitan Milan and hinterland (few municipalities)
- Population: 1.3 million and almost 600 000 households in the Milan municipality
- Customers: a large proportion of Metroweb's business is with Fastweb, with the remainder reportedly mainly with OLOs and Telecom Italia

* Formerly AEM (a 100% municipally owned utility company) before merger with ASM Brescia (another utility company) to become A2A, the largest regional utility company in Italy listed on the Milan stock exchange.

5.3 Finance and ownership



- 2006 saw a major governance change as private equity group, Stirling Square, backed a EUR 230 million management buy-in of Metroweb, under the terms of which A2A retained a 23.5% stake in the business;
- In 2007, Metroweb signed an agreement with Telecom Italia ("TI"). TI gained the right to use the Metroweb access network for 15 years (renewable for a further 15 years) to facilitate the first step of TI's planned national NGN, providing a FTTH GPON architecture; and
- In May 2011, Metroweb was taken over by F2i and Intesa Sanpaolo⁴ which are keen to boost investments into the network. Metroweb was valued at EUR 436 million (10 x EBITDA) after a competitive process based on Metroweb being well placed to implement a national FTTH roll-out, backed by F2i using its FTTH experience to date.

Source: Metroweb.

Reasons for approach

eBiscom entered into a PPP joint venture with A2A to exploit its public illumination network and its experience of managing civil works and subsoil management skills⁵. Metroweb's operating model has since evolved successfully, now having less need for a public commitment from government/public entities as the opportunity to make profits has grown.

⁴ Via Intesa Sanpaolo's IMI Investimenti unit and infrastructure fund.
⁵ Including processes and IT systems.

5.4 Legal status

Status under European Commission Law

Metroweb is a private initiative that started as a local plan. It has become the main provider of fast internet connection and triple-play (broadband, cable tv and telephony) services in Milan and, subsequently, to other areas of Northern Italy.

Metroweb is the result of technological convergence, market liberalisation and lack of incumbent activity, as Telecom Italia (TI) had not previously built any fibre in the area.

The Metroweb PPP initiative allowed the municipality to secure the development of an open utility and long-term revenue streams. It gives Fastweb a largely captive market, due to the absence of investment in the area by TI.

Metroweb has not gained from any state aid approved funding, but a close relationship with the municipality has allowed it to roll out almost 2,000 km of infrastructure in four years in the largest, most densely populated city in Italy.

5.5 Business approach

Procurement approach

Metroweb's market opportunity came from the fact that TI's legacy HFC network (Socrate) was not laid in Milan. The initial exclusivity arrangement allowed Fastweb to become the most significant competitor to TI, delivering new-to-market triple-play over the only comprehensive fibre network in the country.

The early phases of network roll-out involved a significant amount of civil works. Digging and cable-laying were divided into specific metropolitan areas to maximise efficiency. Metroweb commissioned a number of large civil work partners to ensure that network roll-out progressed with commercial activities carried out in parallel.

Market competitiveness

Service provider layer	Open market
Active network layer	Open Market
Passive infrastructure	Metroweb

Metroweb provides access to service providers at the passive layer. It acts as a neutral operator, not offering retail services of its own.

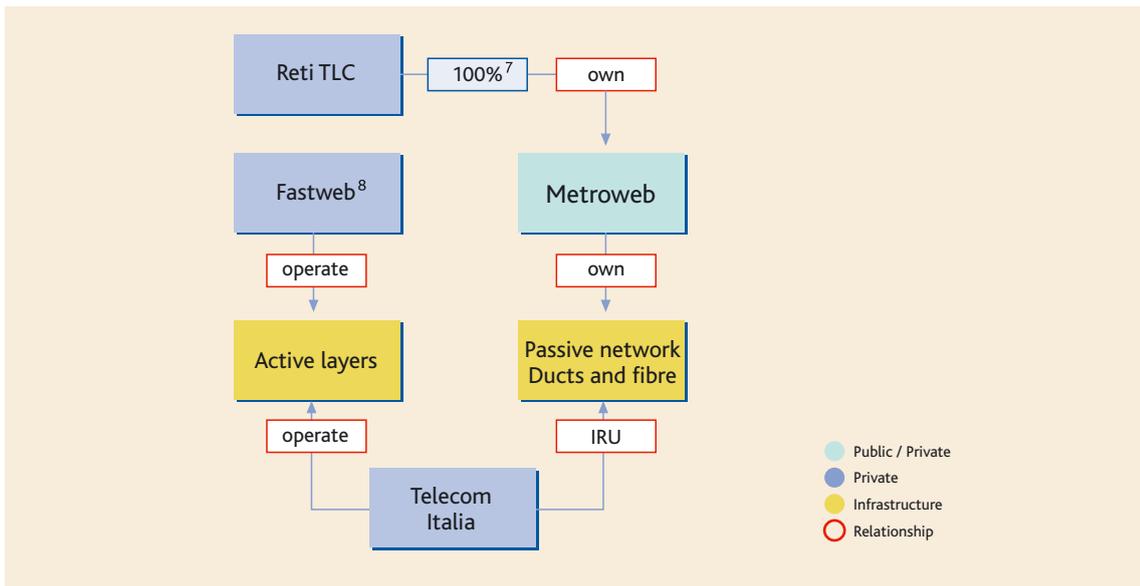
Until recently, Fastweb has been Metroweb's main passive network client (although Metroweb also provides IRUs to many other mobile and fixed OLOs). However, TI is now offering services over the network.

Demand stimulation initiatives

In the mid-2000s, demand stimulation evolved from offering short-term lease contracts (less than 3 years), to availability to all other operators. Currently, a non-proactive commercial approach is relied upon as Metroweb still represents the only comprehensive fibre network alternative in the region.

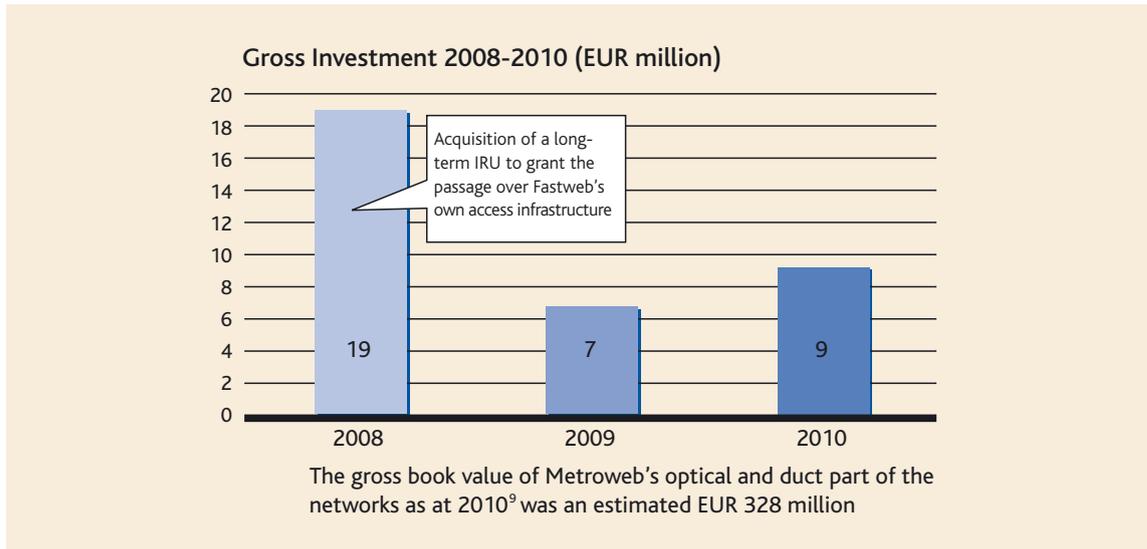
Demand stimulation initiatives by Metroweb have mainly been through the indirect marketing of TI and Fastweb, and the need to replace legacy copper networks.

Management structure⁶ and business model



6 Structure after the May 2011 takeover by F2i and Intesa Sanpaolo to create the SPV 'Reti TLC'.
 7 AZA will hold a convertible bond loan issued by Metroweb that, if exercised, will correspond to a stake of about 25% in the company.
 8 Fastweb is now a fully owned subsidiary of Swisscom when the Swiss company acquired the remaining 17.9% share it did not already own.
 Source: Metroweb, Analysys Mason.

5.6 Cost issues



Source: Metroweb, Analysys Mason.

Implementation costs

Investment in 2010 included EUR 9 million for the development of the network infrastructure necessary to reach new customers and connect buildings for TI:

- EUR 3.3 million on civil works (cable duct); and
- EUR 4.7 million for purchase, laying and connection of fibre optics.

In 2011, TI investment totalling more than EUR 9.1 million was expected for the connection of 7,000 buildings, in addition to approximately EUR 5.4 million for the organic development of the existing network.

Approximately EUR 400 million has been invested to develop the network, including the acquisition of required systems and resources.

Cost and risk reduction measures

Metroweb has established long-term relationships with subcontractors to reduce prices and improve trust. It has also benefitted from its good relationship with the administrative departments in the municipalities in which it operates due to the legacy relationships formed as part of the PPP. This ensures short administrative approval times.

Close relationship with Fastweb¹⁰ and other clients as a result of the high strategic importance of its fibre assets, means that Metroweb has benefitted from a better distribution of its business risks.

⁹ As at 31 December 2010.

¹⁰ Ensuring revenue inflow for Metroweb while securing network availability to Fastweb.

5.7 Network architecture, services and competition

Services

Wholesale

Metroweb offers leased fibre to service providers, generally through short-term contracts (1-3 years), or through long-term (generally 5-15 years) IRUs ("indefeasible rights of use"). Some operators have signed long-term lease contracts, but since 2003 these have been marginalised compared to IRUs.

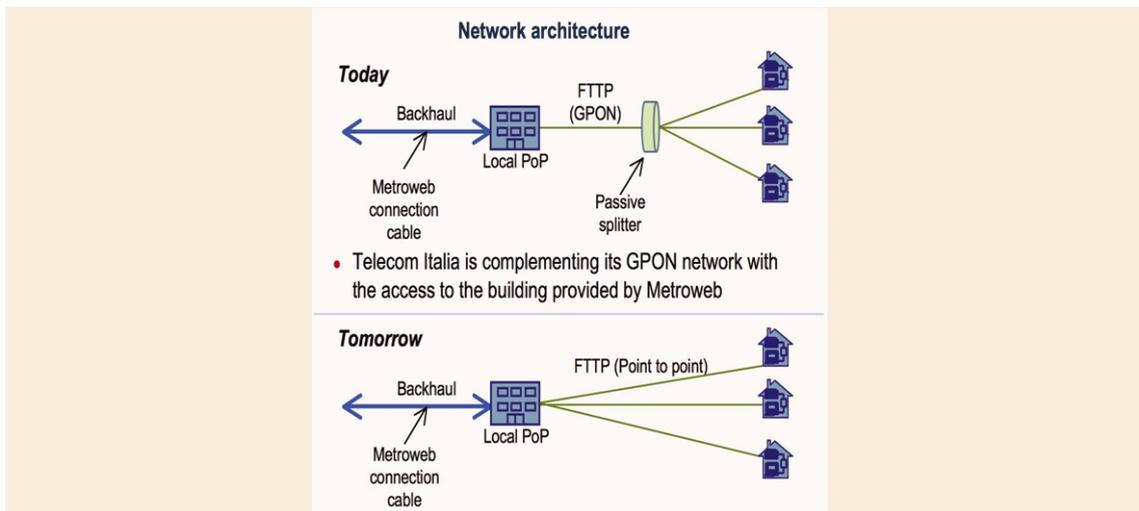
Retail

Fastweb was the first company in the country to offer triple-play services. It continues to do so, combining its own access infrastructure with that of Metroweb to establish itself in other Italian cities.

In November 2010, TI announced it planned to provide a 100Mbit/s service over the Metroweb network in Milan by the end of 2011. This will not become widely commercially available until it has been fully tested in selected cities.

Competition

There is still very little in the way of competition for Metroweb. There is no other alternative high-speed access for residential services in Milan, either fibre or HFC. TI's own on-going roll-out is focused both on businesses and the residential base. TI has legacy copper and offers LLU, but is committed to switch off this network by 2015, hence the development of its own NGN.



5.8 Project summary and lessons learnt

Project Summary

Metroweb is an example of joint venture between the public and private sectors. It demonstrates how a PPP can leverage the assets of a public utility (A2A's street lighting network and civil works skills), without direct support from public funds being required.

The growth of Fastweb's business operations has been the primary driver of Metroweb's expansion. Fastweb continues to generate the majority of Metroweb's revenues, indicating the interdependence of the commercial relationship between the two companies.

The strategic interdependence of Fastweb and Metroweb resulted in the signature of an arm's-length, long-term availability contract to safeguard the interests of Metroweb while assuring continuity of services to Fastweb. This model has proved quite successful for Metroweb, as its strategic infrastructure is gaining increasing attention as it represents a jump-start for the roll-out of NGN network nationwide.

As part of its business model, Metroweb is planning to provide a FTTH solution for OLOs as well (possibly using a point-to-point architecture). This solution is still under evaluation as it represents a large investment, although it can take advantage of the development of NGN for Telecom Italia. It is likely to be developed opportunistically to meet operators' requests.

Lessons learnt

- PPP has provided stability to the shareholder structure;
- Metroweb has been able to benefit from a PPP model by taking advantage of financial resources (such as loans), infrastructure and expertise from its subsequent shareholders – (e.g. with A2A as a local utility shareholder);
- Metroweb had access to ample cash and resources;
- Metroweb gained use of the existing public infrastructure such as public lighting;
- The project has benefited from faster administrative approval times due to its close relationship with local administrations, though always within procedural guidelines;
- The relationships with industry partners brought about short-term sustainability of revenues; and
- In the longer term, Metroweb's relationship with Fastweb ensured a secure source of revenue.

6. Auvergne

6.1 Scope and objectives

Auvergne has already implemented a PPP project to provide basic broadband¹¹ (minimum of 512kbit/s) to the whole population. The Région Auvergne (Auvergne Regional Council), comprising four Départements and six urban areas, has launched a study aimed at developing a regional digital development plan for next generation broadband services.

The objective is for 95% of the population to have access to triple-play services by 2025. In the interim, objectives have been set for business connections, including providing a competitive broadband service as well as symmetrical high-speed bandwidth. This future project is estimated to cost EUR 1.5 billion.

Funding mechanism

Auvergne is an example of the public outsourcing model. This model leverages the expertise of the private sector, while ownership remains in the public sector.

6.2 Key characteristics (basic broadband PPP project)

Characteristic	Description
Distinguishing features	Public outsourcing, where the private operator receives an income to run the network for 10 years
Ownership	Région Auvergne (using its own plus regional, national and European funding)
Wholesale	Passive and active bitstream access to the network operated by France Telecom
Legal status	State aid provided as investment was targeted at white areas
Costs	EUR 38.5 million (512kbit/s), estimated EUR 1.5 billion for NGA

Coverage area

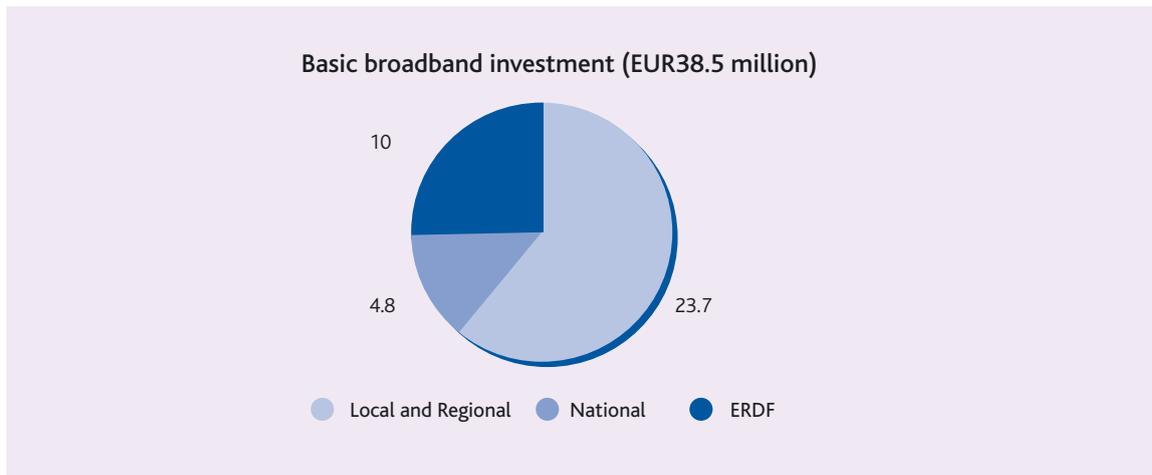


- Environment: predominantly mountainous,
- Population: 1.339 million (60% rural)
- Existing service: 100% 512kbit/s (99.6% DSL, 0.4% satellite). Network completed in March 2009

Source: Région Auvergne.

¹¹ The Auvergne NGA project is in its early stages and as Auvergne has had a successful first generation broadband PPP project, that has been incorporated into this case study.

6.3 Finance and ownership



Investment

The chosen financial model is a PPP between Région Auvergne and a private operator (France Telecom). Région Auvergne provides the funding for the required infrastructure (EUR 38.5 million from the Région, the Départements, the State, and the ERDF) paying the operator for a 10-year contractual period. France Telecom has designed the network and now operates and commercialises it on behalf of Région Auvergne.

Reasons for approach

A PPP appeared to be the best solution on legal, economic and technological levels due to the following factors:

- no private operator was willing to invest in these sparsely populated areas hence the need for public funding;
- Région Auvergne needed assistance in defining the technical, legal and financial aspects of the project. France Telecom recommended the technological, economic and financial solution, allowing Région Auvergne to benefit from the best private sector innovations;
- the PPP was the only model that could enable the quick selection of a contractor and provide income to the contractor in such a sparsely populated region where the return on investment is insufficient; and
- the solution allowed the sharing of risk, France Telecom takes some of the risk and responsibility, especially in terms of technical implementation.

6.4 Legal status

Status under European Law

The Auvergne project qualified for state aid as its main aim was to provide at least 512kbit/s internet access in white areas (4% of the territory and 353 communes) in which an affordable and efficient internet access service (minimum 512kbit/s) was unavailable. Due to insufficient return on investment, the white areas were not in France Telecom's investment plan. The project was identified as meeting the requirements of Service of General Economic Interest (SGEI).

The intervention of Région Auvergne falls within its general mission of developing and opening-up its territories. More specifically, the French law entrusts the regions with a "mission of general interest" to make high-speed broadband internet accessible to the largest possible number of end users. The regions are authorised to cover and organise, under supervisory control, the building and operation of electronic communication infrastructure and networks.

In 2007, the French regulatory authority, ARCEP, approved the technical solution for the network.

6.5 Business approach

Procurement approach

Région Auvergne, as the managing authority, published the notice for a competitive public tender and led the competitive dialogue. It requested the bidders to make one proposal for several modules: (a) design, financing and building, (b) technical operations and (c) commercialisation of the telecoms services on behalf of Région Auvergne.

A selection committee evaluated and selected the proposals according to the criteria specified in the tender. France Telecom was selected in July 2007 and a contract signed in October 2007.

Market competitiveness

Service provider layer	Open market
Active network layer	France Telecom/LLU operators
Passive infrastructure	France Telecom

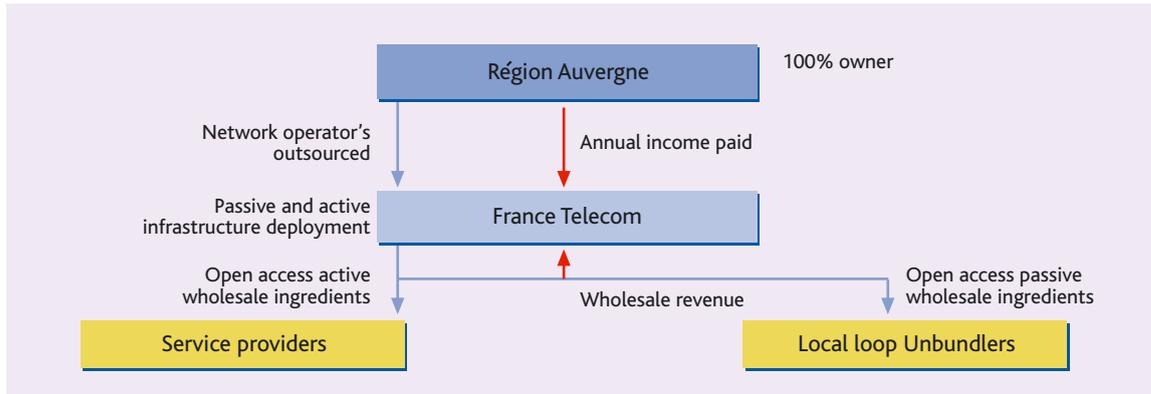
The passive infrastructure is provided by France Telecom which also provides active wholesale bitstream services. Local loop unbundling passive access is also available.

Demand stimulation initiatives

Demand was gauged by identifying lines and communes where high-speed broadband internet was not available. This was based on data purchased from France Telecom, which was compared with complaints from end users.

A website was created to present the project, informing the inhabitants on progress, the commercial opening dates and the internet providers available. Successful promotion of the service meant that one month after deployment around 30% of households who did not have a service previously had signed up to the service.

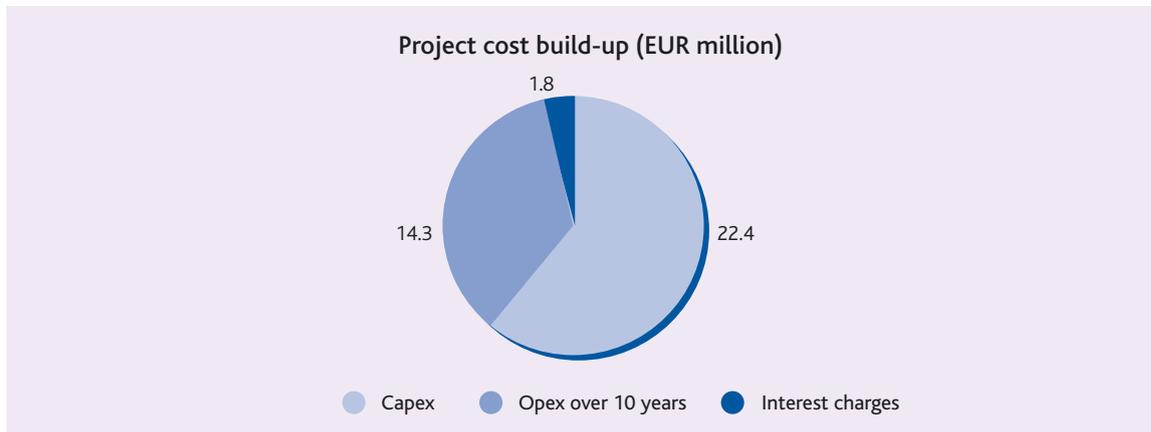
Management structure and business model



Région Auvergne has outsourced the design, build and operation of the high-speed broadband network to France Telecom in a 10-year contract.

France Telecom provides wholesale active and passive services to service providers and LLU operators.

6.6 Cost issues



Implementation costs

The budget of EUR 38.5 million was proposed to fund the provision of broadband services to 338 communes located in white areas.

France Telecom finances the project and submits quarterly rental invoices to Région Auvergne covering capital expenditure, operating expenditure and financial costs. Région Auvergne will pay the rent until 2017.

Région Auvergne funds the payments from the ERDF and CPER national subsidies and from revenue. Any remaining costs are invoiced annually to the departments.

Cost and risk reduction measures

The use of France Telecom’s infrastructure has ensured that the existing final-drop copper infrastructure can be used, keeping down costs in this area. Where possible, France Telecom has used its existing passive infrastructure (e.g. ducts) to minimise civil works costs. However, in some areas the need for a fast roll-out limited the use of cost-reduction measures.

To reduce the risks, Région Auvergne used a matrix for risk sharing between the contractor and the Région and also put in place a system of premiums, penalties and precise objectives for fixed supply dates.

6.7 Network architecture, services and competition

Services

There are no restrictions on the broadband services that can be provided by other operators, either through their own equipment (via LLU) or through France Telecom’s bitstream service.

Competition

Competition is primarily confined to the service providers taking active wholesale bitstream services from France Telecom, but this does allow subscribers to choose from a range of providers that offer competitive prices at a national level.

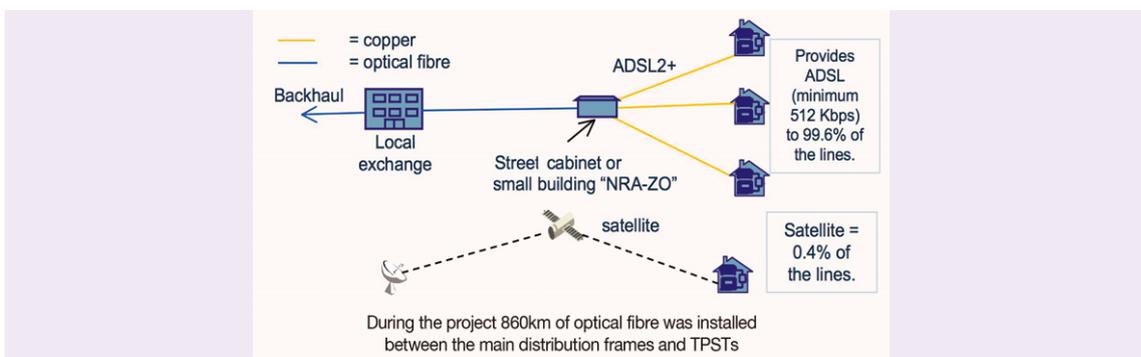
The most important sites are unbundled, but they are very few in number as the operators prefer to use bitstream due to the small number of lines involved. Région Auvergne would respond favourably to operators’ requests for further unbundling and supports the installation of cabinets.

Network architecture

The winning technology for the Auvergne project was NRA-ZO (“new subscriber node in a shadow zone”), where a ‘shadow zone’ is an area with no DSL service. It was proposed during the competitive dialogue phase and was selected as the technically and economically most advantageous technology.

The technology uses the France Telecom’s existing copper network, but reduces the length of the copper loops by running fibre to a cabinet or small building nearer to subscribers, known as a very small technical site or “très petit site technique” (TPST). This decreases copper loop length and enables higher speed DSL services.

The project also supports passive infrastructure as TPSTs are constructed to allow local loop unbundlers to co-locate their active DSL equipment.



6.8 Objectives for next generation access

Project Summary

The Auvergne first-generation broadband project has been successful, but Région Auvergne now wishes to take broadband to the next level. It has launched both a competitive dialogue procurement and a study to determine an appropriate support body, because the annual rental costs are far more significant than the first PPP, and the Région Auvergne is unable to advance them. The support body will advance the annual rent and each partner will pay its share to the support body according to a scale to be determined. The support body and the scale will be subject to high-level political involvement.

Axis 1 - Business market

The objective is to roll out a new broadband service for businesses in places where it is not yet available and enhance competition in areas where it is available but at a high wholesale price.

- Offer symmetrical very high speed broadband services to businesses at affordable prices by running fibre either to companies (FTTB) or to business zones; and
- Upgrade local area networks with fibre technology.

Axis 2 - Residential market

Currently, 58% of lines are capable of supporting triple-play services, although only 36% are being offered this service. The objective is to provide triple play capability to 95% of the population by 2025.

- Using a combination of FTTx (72%), greater speeds over copper (DSL) and microwave and satellite for the remotest 5% of the population; and
- A three-stage roll-out plan has been formulated with intermediate milestones in 2016, 2020 and 2025.

Région Auvergne NGA roll-out schedule

Région Auvergne NGA roll-out schedule				
	Today	Phase 1	Phase 2	Phase 3
Triple Play	58%	81%	91%	95%
FTTx	8%	30%	64%	72%
private	8%	25%	43%	43%
public	0%	5%	22%	30%
ADSL	57%	67%	67%	66%
private	53%	53%	53%	53%
public	4%	14%	14%	13%
Other technology	0%	12%	9%	10%

6.9 Approach to next generation access

Contractual arrangements

The NGA project will be implemented through a PPP contract where the contractor will have to design, build, finance and operate the infrastructure and commercialise services to telecoms operators or internet service providers. The contract will last 24 years from 2013. A support body at regional level will be set up in order to pay the rent to the contractor and receive the payments from the partners.

Network objectives

The infrastructure should provide:

- Symmetrical and guaranteed services to businesses at a minimum speed of 4Mbit/s and up to 100 Mbit/s and more (axis 1);
- A multi-device triple-play service to residential end users with a 100% coverage at 2Mbit/s minimum at the end of stage 1 (axis 2); and
- An asymmetrical service of 8Mbit/s to ISPs, and will aim to provide increasingly symmetrical speeds up to 100Mbit/s and more in the short term and 1 Gbit/s in the long term.

Coverage

The project will cover the whole regional territory except the areas where operators intend to invest in very high speed broadband for a residential market in reply to a national call for expression of interest. This applies to six urban areas in Auvergne. The project will cover these areas if the investments by operators are not made or are delayed. A committee monitors the progress of these investments and is able to revise the undertakings if conditions change over the 24-year period.

6.10 Estimated cost per FTTH line

In Auvergne, a large part of the population (about 800,000 people out of 1.3 million) is not covered by the operators' FTTH investment plans. The roll-out of NGA broadband in these areas is very expensive and can only be achieved with public financing from local authorities or public initiative networks (PINs) and other public aid. The roll-out depends on public subsidies.

The cost per FTTH cost per line varies significantly from under EUR 1,150 to over EUR 5,000 per installation.

6.11 Project summary and lessons learnt

Project summary

The Auvergne project is an example of the public outsourcing model. The Région Auvergne broadband project and subsequent NGA project cover the whole region and are directed by a dialogue forum which includes national and regional government, the four départements and the six urban areas. This approach has been adopted as the roll-out requires consensus between territories and consistency in the actions taken.

The first stage of bringing broadband (512kbit/s) services to 100% of the population was successfully achieved in 2009 by engaging France Telecom to provide service for 10 years in a DBO contract.

Région Auvergne is now commencing procurement and seeking funding for the roll-out of NGA services in stages, with the first target being to provide 2Mbit/s to all users. Providing 100Mbit/s and then 1Gbit/s symmetrical services for business and residential users is the long-term objective.

A partner is being sought to design, build, finance and operate the infrastructure, and commercialise services to the wholesale market for 24 years from 2013.

Lessons learnt

- A permanent dialogue is needed between the regional partners to maintain consistency on a region-wide scale. In France, the rolling out of broadband is not the responsibility of one specific authority and this is why the project intends to transfer the responsibility to a support body at a regional level;
- Rural broadband roll-out has a number of specific issues that need to be understood and addressed at a national and European level. Région Auvergne has published a plan for its rural area – to be shared with other European institutions and bodies; and
- In view of the high cost of NGA broadband (fibre for all in Auvergne will cost EUR 1.5 billion), local authorities need public financing from the state and the European Union. The project is phased because implementation will depend on obtaining this aid. A permanent dialogue is needed between the regional partners to maintain consistency on a region-wide scale.

7. Progetto BUL Lombardia

7.1 Scope and objectives

The BUL (Banda Ultralarga in Lombardia) Project aims to bring FTTH to 50% of the population of Lombardia, covering 167 of its 1546 municipalities (excluding the Milan municipality) over the next six to seven years.

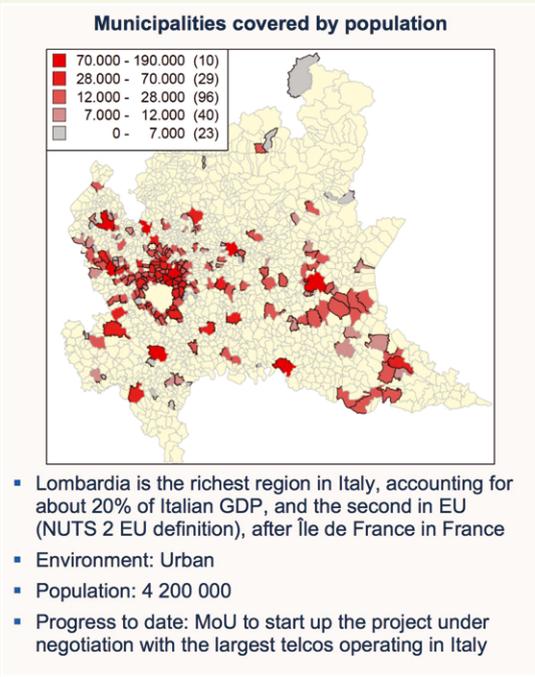
The project is intended to help operators overcome market entry barriers, develop demand and enable services that will improve productivity, efficiency, competitiveness and quality of life. The project is seen as key to keeping up with other industrialised areas in Europe.

Funding mechanism

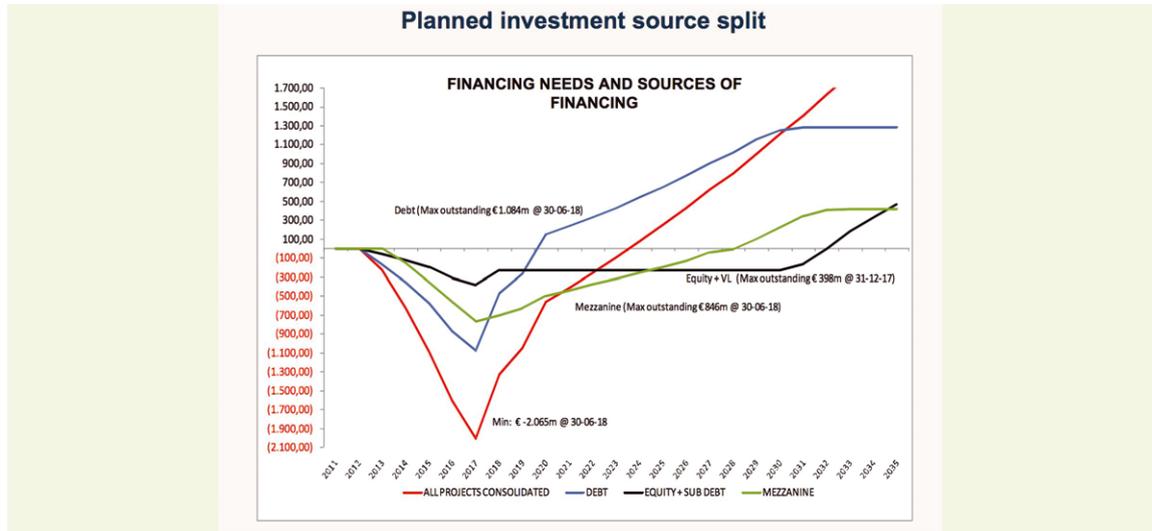
The BUL project is an example of the joint venture model. This will enable it to secure expertise and financing while maintaining public control over the scope of the project.

7.2 Key characteristics

Characteristic	Description
Distinguishing features	Public / private joint venture combining the switch-off of the old copper infrastructure and an organic approach (creating the infrastructure and developing demand)
Ownership	Regione Lombardia, telecommunication operators and service providers, system vendors and infrastructure funds
Wholesale	Passive fibre access for service providers
Legal status	To be defined as part of the on-going negotiation with the telcos interested in the project
Costs	Overall budget estimated at EUR 2.0 billion (equity, debt and mezzanine)



7.3 Finance and ownership



Investment

It is estimated that the total project investment will be EUR 2 billion. The project has been split into two sub-clusters, and the first of these is split into six groups.

Each sub-cluster is assumed to be built by a dedicated SPV responsible for carrying out the investment. 80% of the capital of each SPV will be provided by telecoms equipment vendors, and the remaining 20% by a NewCo. NewCo's share capital will be subscribed 51% by Regione Lombardia and 49% by the OLOs ("other licenced operator") and the incumbent. NewCo's governance will ensure voting control by Regione Lombardia until the completion of construction. Vendors will then have a way of exiting the project, as an infrastructure fund will be set up to acquire their stakes.

The vendors and NewCo will then enter into a put & call agreement with a specialised fund which has a medium/long-term investment horizon. For the vendors, the put & call is a contract to sell their participation in the SPV to an infrastructure fund at a given time at a fixed price. Telecom Italia in turn has a contract to buy the mezzanine finance from NewCo, this consists of a subordinate loan lent by the NewCo to the SPV. Having become Newcos mezzanine lender, TI will subsequently have the right to convert this mezzanine loan into SPV shares at a conversion ratio agreed between the parties.

Reasons for approach

This approach is seen as a way of securing private sector funds and expertise while financing the acquisition and also providing compensation for the switch-off of the incumbent's copper network.

7.4 Legal status

Status under European Law

Private sector investment has been sought by the regional government ("Region"). However, the Region will retain control of the project until the completion of the construction phase through its role in the NewCo managing the SPVs implementing the project.

Memorandum of Understanding (MoU)

An MoU has been signed between the Italian Government and the main Italian Telco operators. The BUL project falls into this category.

The BUL Project aligns with the MoU. The main principles of the MoU are:

- the use of the PPP model to realise the passive infrastructure needed to deploy the NGN;
- the sharing of planning and financing activities for the realisation of passive infrastructure between central government, telecom operators, local public authorities (especially Regions) and public and private financial institutions; and
- the definition and management of local initiatives at the operating level are delegated to Regions, as has already happened with Regione Lombardia for BUL Project.

7.5 Business approach

Procurement approach

Partners in the SPV and in NewCo will be chosen through a public tender.

Market competitiveness

Service provider layer	Open market
Active network layer	Open market
Passive infrastructure	SPV Company

The SPV company will provide operators with access on an open access / network-neutral basis. Central aims of the project are to create a level playing field for operators and to foster competition.

It is expected that existing telecoms operators will migrate customers to the new infrastructure.

Demand stimulation initiatives

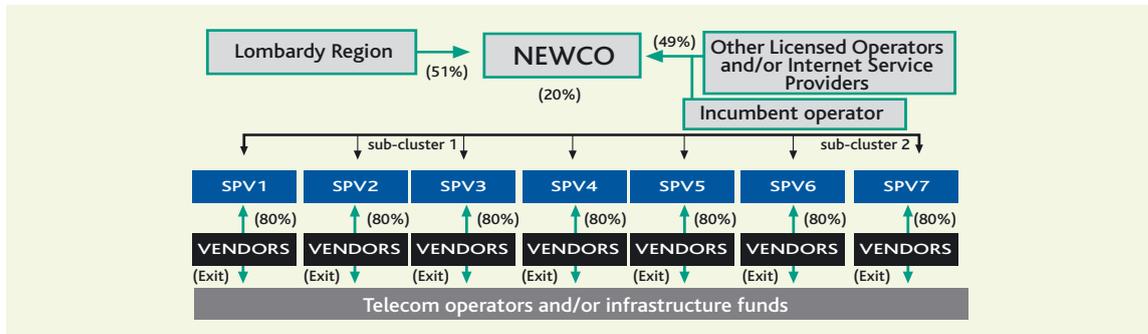
Regione Lombardia intends to stimulate demand by developing targeted services by demand type (public administration, businesses, private users) and initiatives to promote digital service use. Efforts will be made through investment to digitalise and centralise services on one regional system. Finally, ICT-producing sectors will be strengthened and ICT education will be used to enhance collaboration between businesses.

Management structure and business model

The project has been split into two clusters based on housing density and geographical location. The first cluster (with highest population density and concentration of businesses) has been further divided into 6 sub-clusters.

Each SPV will be responsible for building the network for each sub-cluster/group and is expected to be an international operator with a track record of delivering similar projects.

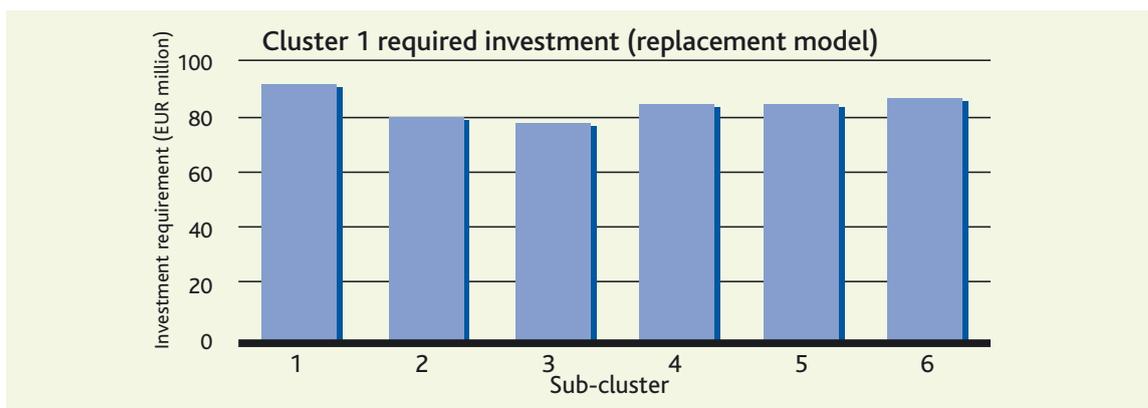
NewCo will be responsible for sourcing the funds required for the completion of the infrastructure, preliminary design/implementation, investment control, organisation/coordination/performance of all general services to the SPVs, selling capacity, negotiating operation and maintenance contracts, and marketing and promotion.



7.6 Cost issues

Implementation costs

The overall budget for the project is estimated to be EUR 2.0 billion. A more detailed analysis of the maximum financial requirement for each of the sub-clusters in the Cluster 1 deployment has been completed. Each of the six sub-clusters has a broadly similar financial requirement, with an overall maximum requirement of EUR 503 million.



Cost and risk reduction measures

The BUL Project plans to optimise delivery by:

- implementing civil works together with other works conducted by third parties;
- using existing infrastructures capable of hosting the network (e.g. public lighting, district heating and sewer networks); and
- minimising charges for road surface restoration by leveraging their relationships with the respective municipalities.

7.7 Network architecture, services and competition

Services

The SPV company will own the passive access infrastructure and rent access to operators on a client-by-client basis.

At the service application layer, it is expected that the network will enable high bandwidth services covering public services, teleworking, remote collaboration and e-health applications as well as new service areas such as cloud computing, smart grids and next generation TV services.

Competition

The level of infrastructure competition will depend to some extent on whether Telecom Italia migrates its customers onto the Progetto BUL Lombardia network and turns off its existing network. However, even if the Telecom Italia copper-based network continues to operate, the business plan assumes a market penetration of 60%.

The BUL Project will cover only areas in which no other fibre providers are operating.

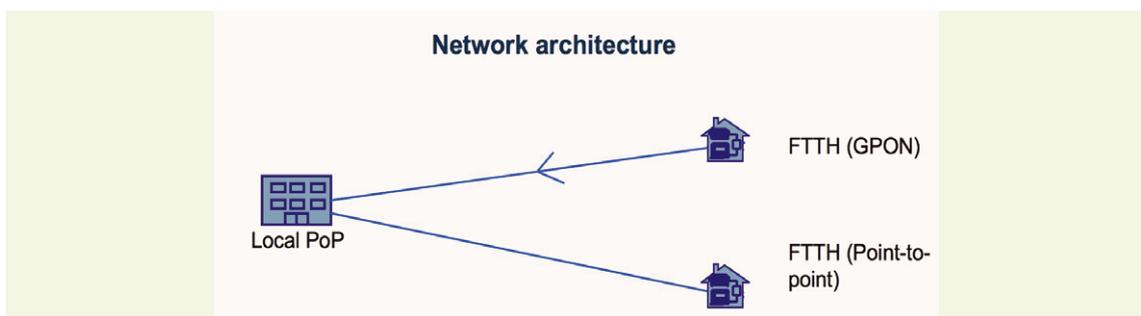
In the area competition will be possible only on a client-by-client basis.

Network Architecture

The network will provide fibre access to homes and businesses (FTTH) and will be a hybrid GPON ("Gigabit Passive Optical Network") and point-to-point architecture. This reflects the telcos' preferences regarding network infrastructure, as the incumbent (Telecom Italia) prefers GPON architecture while OLOs prefer point-to-point architecture.

In the GPON case, it is expected some users will have dedicated fibre links that may increase over time.

Under the assumption of a total copper replacement in the area covered by the project, GPON and point-to-point will co-exist in the same PoP, with telcos using the same upgraded infrastructure for backhaul connections as used for unbundling the copper-based network.



7.8 Project summary and lessons learnt

Project Summary

Project BUL is a joint venture between Regione Lombardia and the four main telecom operators: Telecom Italia, Vodafone, Wind and Fastweb. BUL's area includes 167 municipalities (excluding Milan) with a total of 1,960,977 households.

The agreement (currently under negotiation) with the telcos foresees the OLOs and Telecom Italia migrating their whole client base onto the new infrastructure as soon as it becomes operational. The incumbent's copper network will be switched off in return for adequate compensation.

The infrastructure will be built using a hybrid architecture (GPON + P2P), consistent with plans to roll out a national NGN infrastructure.

The project foresees a horizontal infrastructure connecting 100% of households and a vertical infrastructure connecting 92% of households.

The public authority role is key to ensuring a level playing field for operators, fostering competition, stimulating demand and promoting digital service use.

Lessons learnt

- Promoting demand generation, potential customer base expansion and the offer of services targeted to NGN users improves the project's returns and has a positive economic impact on local economies. This lowers the net public cost of the project while enlarging its scope;
- The switch-off of the legacy copper network ensures very low market risk, as the OLOs and the incumbent will undertake to migrate their whole client base onto the new infrastructure;
- The long-term commitments and the participation of the incumbent also mitigates the technological risk, i.e. the risk of the development of an alternative network;
- The technology/construction risk is mitigated through the participation of vendors in the equity of each SPV;
- Risks associated with the construction of the project are to be mitigated via turnkey contracts, i.e. based on fixed time and costs;
- The chosen financial and contractual structure – together with the commitment of the Regione Lombardia ensuring that the authorisation and interactions with the local municipalities will proceed without any delay or extra costs – further supports the bankability of the project; and
- The risk of delay, whilst mitigated, is linked to the complexity of migrating the operations of all clients, under a single commercial, legal and technical profile.

8. MAN Project, Ireland

8.1 Scope and objectives

The Metropolitan Area Networks (“MAN”) Project has deployed a network of over 1,000 km of ducting, sub-ducting and high-capacity fibre-optic cable, as well as co-location facilities. The network was rolled out in areas without adequate private sector broadband provision. The aim was to lower entry barriers for alternative operators to boost the competitive supply of services.

The main objective of the MAN Project was to provide communications infrastructure (ducts, fibre) and wholesale services to operators, thereby reducing the high fixed cost of building their own infrastructure, which represented the most important barrier to entry in the market at the time.

Funding mechanism

The MAN project is an example of the public outsourcing model. It will allow the public sector to retain a high level of control over deployment whilst leveraging private sector expertise.

8.2 Key characteristics

Characteristic	Description
Distinguishing features	100% public owned; managed, maintained and operated by e net ¹² on a concession basis
Ownership	The Government of Ireland using national and European funding
Wholesale	e net sells open access active and passive wholesale services to operators
Legal status	State aid provided to address market failure in the provision of broadband services
Costs	EUR 170 million of public money



Location of the 94 MAN nodes across Ireland

- Environment: 94 predominantly larger towns and cities with outside of Dublin. The towns for priority investment included those identified in the National Spatial Strategy (NSS)¹³
- Over 33,000 businesses premises passed (that is, located within 50m of fibre network)
- MAN towns have over 350,000 homes

Source: e|net, European Commission

¹² A private company.

¹³ The NSS aims to achieve a better balance of social, economic and physical development across Ireland, supported by more effective planning. Further details of these areas are accessible here: <http://www.irishspatialstrategy.ie/>.

8.3 Finance and ownership

The MANs are managed for the state on an open-access basis by e|net, which was awarded two separate 15-year concession contracts¹⁴. The initial agreement (Phase I) was based on 28 locations at an expense of EUR 78 million funded through the DCENR. In 2009, e|net was awarded a second (and separate) 15-year concession to manage Phase II across an additional 66 towns in Ireland. The terms for these concessions include a revenue share (which is subject to minimum cash amounts) from e|net to the DCENR for each year of the concession. At the end of the contract period, e|net is obliged to hand over the network (including added infrastructural investment) to the Government. Both entities, as well as retail service providers and end users are beneficiaries of the network.

Investment

A total public investment of EUR 170 million. Local or regional authorities provided 10% of the amount towards construction costs of ducts and fibre for each phase of the project. The remaining 90% was from the DCENR of which about half of the funding was contributed by the ERDF. The passive MAN infrastructure remains entirely under state ownership.

Direct investment by the private sector has gone towards active network elements as well as further extension of the passive infrastructure. Investments by e|net¹⁵ have amounted to about EUR 17 million, a percentage of which went to extending network footprint by a further 103km.

Reasons for approach

The State's role at the time of planning of the MAN Project was to "...provide seed capital because 'Government is not in the telecommunications business'. There would also be a requirement that Government intervention would attract the optimum level of private sector involvement and result in open-access and pro-competitive solutions".¹⁶

The approach has led to a decrease in the barriers for entry of existing operators (the likely customers of e|net), allowing them to construct a viable business case for private investment in under-served urban areas of Ireland.

8.4 Legal status

Status under European Law

The MAN Project addresses a market failure by providing infrastructure in areas where the private sector was unwilling to invest or availability was limited. For instance, prior to the launch of e|net services, one option for operators wishing to connect customers was to lease capacity from the incumbent, eircom. However, eircom at the time did not make its dark fibre available to other operators, meaning there was no competition in the market.

MANs were built in the identified towns where an open neutral metropolitan wholesale infrastructure was not available. Several operators are able to use the infrastructure simultaneously, as they have access to sub-ducts and fibre pairs to allow expansion of their own network infrastructure.

This focus on under-served areas made the Irish MAN Project compatible with the EC Treaty rules on state aid. It was deemed that any market distortion introduced would be within acceptable levels.

¹⁴ Issued by the Department of Communications Marine and Natural Resources (now DCENR) in June 2004.

¹⁵ Source for investments where a combination of private equity investment and loan facility arranged when the concession was signed. On-going investment have also been funded by operator clients. Source: e|net, European Commission.

¹⁶ Value for money and Policy Review of Metropolitan Area Networks, DCENR 2008.

8.5 Business approach

Procurement approach

Central Government made funds (including structural funds) available to local and regional authorities. In turn, the public authorities added their own funding and civil engineering companies tendered for the construction of passive network infrastructure (civil works, ducts, fibres).

The local authorities also built operator-neutral co-location facilities (PoPs) where telecoms operators may install their equipment.

Consultancy cost for Phase I amounted to approximately EUR 4 million, which involved administering the grant aid of EUR 78 million. This was done via contracts with ten contracting agents representing a total of 28 towns.

Market competitiveness

Service provider layer	Open market
Active network layer	e net
Passive infrastructure	e net

Under its agreement with the Irish Government, e|net offers operators wholesale services (active) and infrastructure¹⁷ (passive) - including ducts, dark fibre and very-high-bandwidth services over fibre - on a non-discriminatory basis.

It acts as a neutral operator, not offering retail services of its own.

Demand stimulation initiatives

e|net liaises with local authorities and public sector organisations on an on-going basis to understand their requirements. e|net then works with the operators (its direct customers) in delivering their retail services. This helps ensure that demand for connectivity services by residential/business customers and public sector organisations are met.

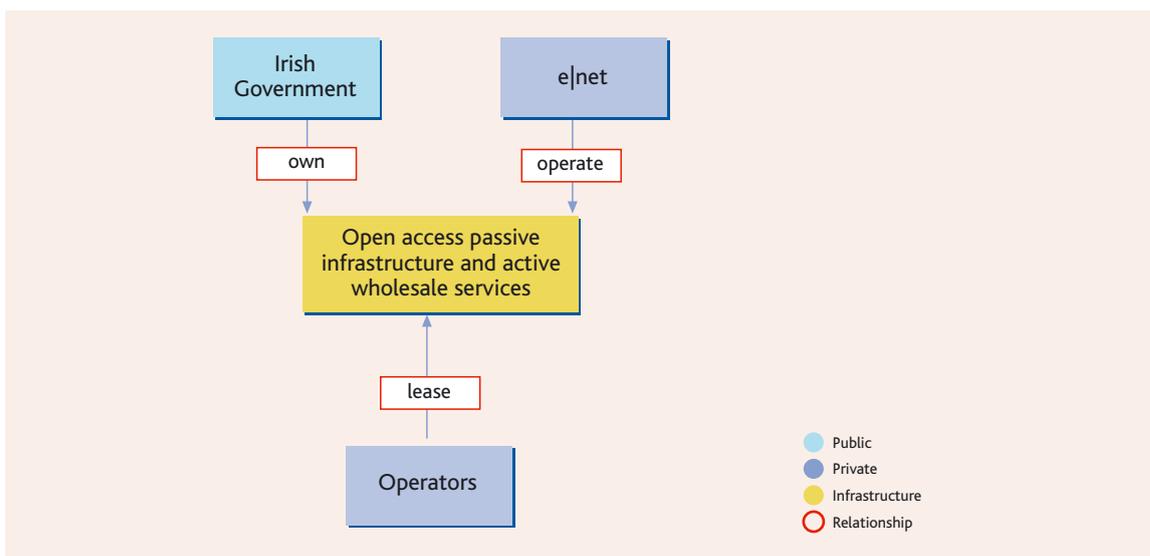
¹⁷ Comprising of four ducts each of which have four sub-ducts, one of which is fibred with the trunk cable allowing for high capacity to cater for needs into the future. Source: e|net, European Commission, Analysys Mason.

Management structure and business model

After an open procurement process in 2004, e|net was awarded an exclusive concession to act as a Managed Services Entity (MSE) to operate the MANs on a wholesale, open-access telecommunications infrastructure.

e|net is a privately owned company, with Michael Tiernan and ACT Venture Capital holding the controlling interest.

e|net provides services to authorised operators only. The premises or company that connects to the MAN does so via an operator. e|net does not sell directly to end users/consumers.



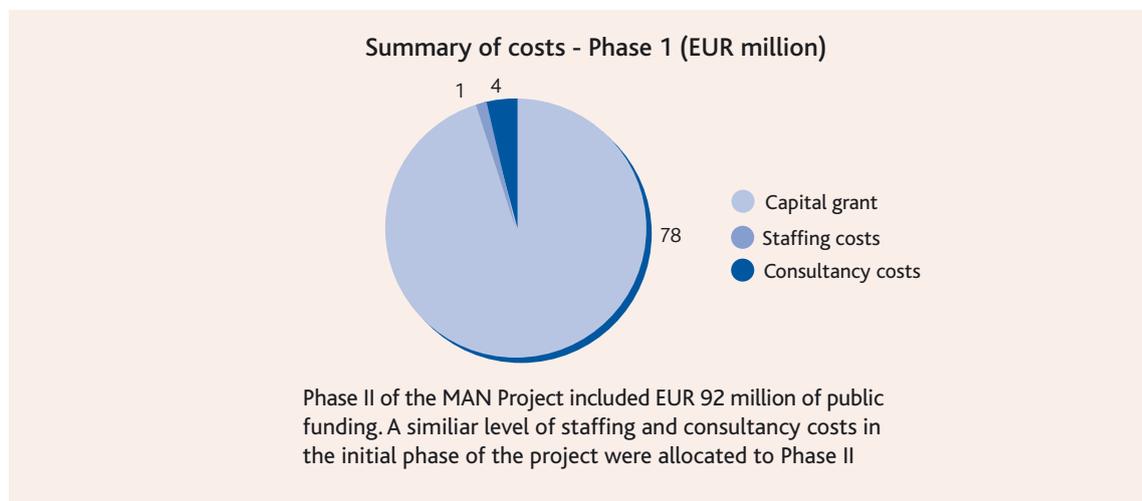
8.6 Cost issues

Implementation costs

The complete route length of Phase I is 527km, for which a total of EUR 78 million was granted. This grant went towards the cost for fibre, duct, sub-duct, chambers, construction and co-location cabins. The average grant paid over the entire Phase I was approximately EUR 148,000 per kilometre of network.

e|net was not involved in constructing the network as the local authorities were responsible for building the network to DCENR specifications.

In cases where buildings are not connected to a MAN, e|net constructs a new 'drop' connection. In some cases, e|net recovers the cost for these connections from the operators/retail service providers. In other cases, where it is commercially viable to do so, e|net funds the connection costs from its own resources. However, these costs have proved a barrier to the level of take-up.



Cost and risk reduction measures

Local authorities were required to identify appropriate publicly owned infrastructure and premises that could be utilised for building the network. Co-location infrastructure, where possible, is situated in local authority premises.

Civil work and general construction specifications were designed centrally in-house by the DCENR, ensuring a consistent approach was taken throughout the project.

Strong demand stimulation activity should help to drive take-up. In addition, take-up will also be driven by access to BT's existing large number of service providers, who have already invested in large scale wholesale service provisioning systems to interface to BT.

8.7 Network architecture, services and competition

Services

Wholesale – e|net has signed wholesale agreements with many service providers, with up to 23 per MANs (some service providers do not have services on all MANs).

Retail - the following are some of the retail service providers that utilise the MAN:

- BT Ireland – utilises e|net’s suite of Managed SDH services. In October 2008, BT Ireland signed a EUR 1.2 million contract with e|net to use its MANs to offer ethernet services across e|net’s Phase I locations. Availability of the MAN service has meant that since 2009, BT Ireland has been able to concentrate on ICT services for mid-sized businesses, corporate entities and public sector organisations;
- Vodafone Ireland – offers fixed services having acquired both fixed ISP Perlico and the retail residential and small business fixed voice and broadband business of BT Ireland in August 2009. It signed a 15-year EUR 17 million lease in 2009 to utilise e|net’s dark fibre; and
- UPC – utilises e|net infrastructure in delivering its fibre-based triple-play cable services (offering packages of phone, TV and broadband services at less than EUR 100).

Competition

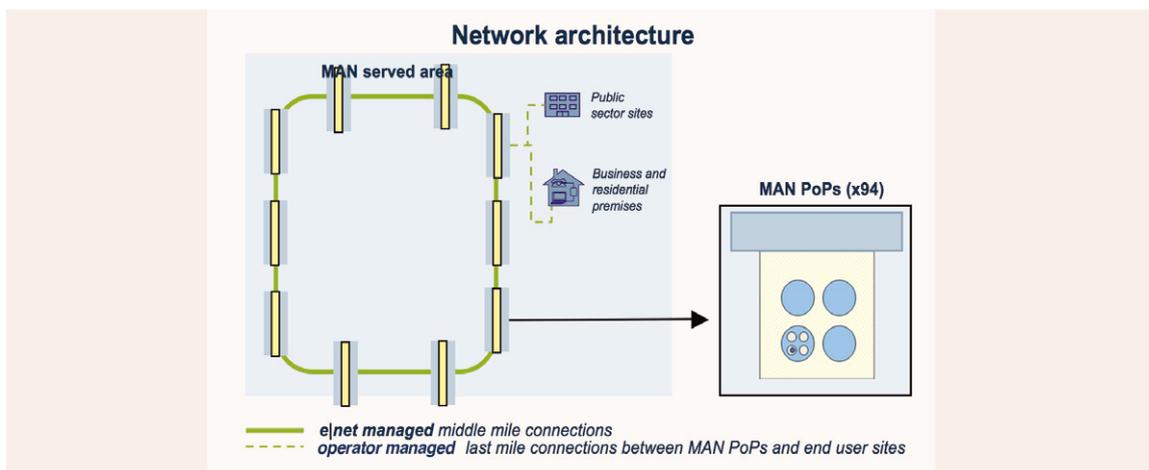
In most MAN locations, eircom is the only provider of fibre-based bandwidth services. eircom does not make dark fibre available on a wholesale basis. e|net faces almost no dark fibre and little high-speed competition in the towns covered by the MAN Project infrastructure.

Network architecture

The network has a typical ring topology across Ireland, consisting of four carrier-neutral ducts (and four sub-ducts) and fibre rings linking the main commercial and public buildings to the PoPs.

Being a ‘middle-mile’ network, telecoms operators purchasing wholesale services from e|net still have to provide their own fixed or wireless local loop (last mile) infrastructure.

eircom¹⁸, ESB Telecoms¹⁹ and BT Ireland are the main backhaul infrastructure owners in Ireland.



¹⁸ With 324,000 wholesale lines and about 12 000 km of fibre as at September 2010.

¹⁹ Owns and operates over 300 telecoms masts and has installed 1300km of fibre optic cable around Ireland.

8.8 Project summary and lessons learnt

Project Summary

The MAN project is an example of the public outsourcing model.

The MAN Project has made a significant contribution to the development of telecoms infrastructure in Ireland at a time of identified market failure caused by telecoms operators not investing in network assets.

The availability of the MANs has helped the case for regional investment made by both national and international companies. The provision of telecoms infrastructure is a prerequisite for attracting economic investment to an area.

MANs have provided their client customers with much greater choice, and better service and prices for broadband (and telephony) connectivity. They have contributed significantly to the competitiveness of regional centres in Ireland, and thus their attractiveness to international direct investment. The justification and value of state intervention is demonstrated by the immediate take-up of the MANs, the uses to which they are being put and the impetus provided to competition in the sector.

It is difficult to quantify the exact number of potential retail customers, but the 94 towns covered by the MANs have in excess of 750,000 inhabitants.

There have been some barriers to take-up of services including the relatively high customer connection cost and the fact that access to competitively priced backhaul to link the MANs has been a challenge.

Lessons learnt

- Not all private sector supporters for the roll-out of the networks followed up their initial support by purchasing e|net services. In some cases they have invested in their own private networks (usually P2P microwave systems) as this has provided them with a better business case;
- The MAN intervention has not worked as well in smaller urban areas, although they are most in need of intervention. Two of the Phase I MANs, located among the smallest of the towns selected, are still without a client. There is a significant cost to operators to connect to the MAN due to the lack of competitively priced backhaul services. This makes it unattractive to invest in areas²⁰ without a critical mass of potential customers;
- MSEs need to be encouraged to invest in the asset throughout the lifetime of the concession. All investment in equipment or MAN extensions made by e|net become part of the asset, therefore the incentive to invest during the later years of the concession period is low; and
- Return on investment is dependent on the ability to earn revenue on the business transacted on the asset. Under the present arrangement it becomes difficult to make a return as the concession approaches its end.

²⁰ Areas actually targeted to benefit from the availability of next generation access infrastructure and the services they provide. Source: DCENR, Analysys Mason.

9. Shetland SHEFA 2 Interconnect Project

9.1 Scope and objectives

The Shetland SHEFA 2 Interconnect Project (“Interconnect Project”) forms part of Shetland Island Council’s (“SIC”) strategy to encourage a rapid deployment of broadband networks in Shetland. It relates to the provision of a next generation core network connection between Lerwick, the main town in the Shetland Islands, and an existing sub-sea cable, SHEFA-2. The cable is operated by Faroese Telecom²¹ and lands in the south of the Shetland Islands.

The main objective of the Interconnect Project is to provide adequate backhaul network in the Shetland Islands in areas where such infrastructure is currently unavailable, and no similar backhaul services are planned by operators on commercial terms.

Funding mechanism

The Interconnect project is an example of the public outsourcing model.

9.2 Key characteristics

Characteristic	Description
Distinguishing features	Remains wholly public owned; a commercial operator to exploit on a wholesale basis.
Ownership	The SIC using national and European funding.
Wholesale	Planned arms-length public-private SPV offering wholesale services to third party operators.
Legal status	State aid provided to address market failure in the provision of broadband services
Costs	EUR 1.7 million budget

Coverage area



— Phase 1 Lerwick to SHEFA 2
— Phase 2 Lerwick to Scalloway
— Phase 3 Scalloway to SHEFA 2
— SHEFA 2

Environment: The formation of a backhaul network that passes three main towns on Shetland’s south mainland. The network passes 1000 households (excluding Lerwick)²² and also connects 11 Council-owned premises

²¹ Faroese Telecom installed SHEFA-2 in 2008 to improve its own backhaul connectivity to the Faroe Isles. This submarine cable passes through Shetland, but does not connect to the local telecommunications networks in Shetland.

²² Expected to be covered by BT’s ADSL2+ roll-out in the area.
Source: European Commission, Analysys Mason.

9.3 Finance and ownership

SIC will finance the construction of the backhaul network providing a robust resilient link for internet services and will retain ownership of the infrastructure.

SIC's preferred option is to invest in the network infrastructure and form an arms-length SPV²³ called Shetland Telecom to manage and operate the network infrastructure at the wholesale level.

The SPV is expected to be in the form of a partnership between SIC and an established telco partner, with the SPV independent of SIC control. This SPV will function as the wholesale service provider of the network infrastructure; possibly on a rolling three-year contract – effectively as a public outsourcing project. A tender process to select the preferred telco is currently underway.

There is the expectation that if no private telco partner is found, the SIC will become the wholesale managed service provider with an arms-length publicly owned entity (Shetland Telecom) responsible for day-to-day running of the managed service operation.

Investment

The amount of public funding is EUR 1.7 million, out of which about 25% is financed from ERDF monies and the rest directly from SIC funds.

The recommended investment model identified by SIC used public-sector funds to extend high-speed connectivity beyond the sole usage of public sector organisations, to the businesses and citizens of Shetland.

It is expected that the basis for the public-sector funding agreement will be that a significant proportion of the generated profit will be returned to SIC.

Reasons for approach

SIC wishes to leverage the expertise of the private sector to manage the network and this is why a private operator is included in the SPV.

The plan is for the SPV to provide wholesale backhaul services to the service providers in the Shetland Islands at current market prices. It is hoped that this will encourage service providers to use this wholesale access to provide new and improved retail broadband services, thus ensuring open competition.

23 Source: European Commission, Analysys Mason.

9.4 Legal status

Status under European Law

Telecoms traffic in Shetland is currently backhauled to the Scottish mainland via two microwave links operated by BT and Cable & Wireless. These are sometimes adversely affected by local weather conditions.

No affordable or adequate services are offered to satisfy the needs of citizens or business users, and the commercial operators had no plans to invest further to provide the Shetland Islands with the required services within the foreseeable future.

This focus on under-served areas and the objectives of SIC to have a resilient backhaul network priced at affordable rates, made the Interconnect Project compatible with EC rules on state aid.

The Interconnect Project was also in line with the EC's Digital Agenda which calls on Member States to use public financing to meet the coverage and speed and take-up targets defined in the Europe 2020 Strategy.

9.5 Business approach

Procurement approach

A competitive dialogue process is underway to select a private telco partner that will operate the network on an open access wholesale basis.

The civil works procurement approach was an open tender with a defined specification. A number of local partners emerged that were capable of providing the service.

Market competitiveness

Service provider layer	Open market
Active network layer	SPV (Public and Private) ²⁴
Passive infrastructure	SIC (Public)

SIC will retain ownership of the infrastructure and ensure that the network will be accessible to all commercial providers in a fair and equitable manner.

There is a possibility that SIC – through its arms-length entity, Shetland Telecom – will also manage the active network layer. However, SIC's objective and preference is for this layer to be managed by an established telecoms operator.

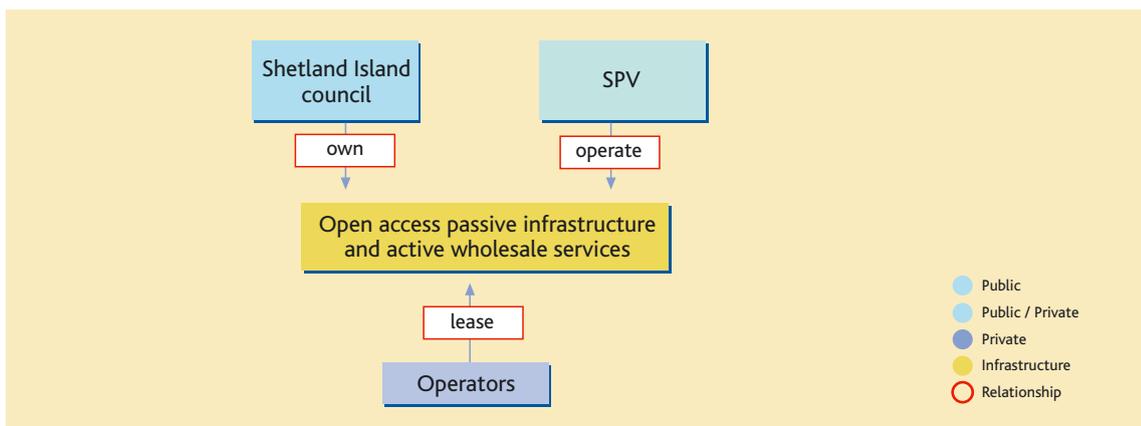
²⁴ As mentioned earlier, on failing to secure a private sector Telco partner, SPV could be a 100% public owned arms length entity. Source: European Commission, Analysys Mason.

Demand stimulation initiatives

There is latent demand for resilient and fit-for-purpose backhaul network infrastructure. The expectation is that this latent demand will not require specific demand stimulation initiatives initially.

There are, however, plans for SIC to carry out a demand stimulation exercise in March 2012 in order to revisit any demand issues that might have developed during the implementation stage.

Management structure and business model



9.6 Cost issues

Implementation costs

- Total installation cost amounts to EUR 1.7 million. Approximately EUR 60,000 has been invested by the civil works contractor in the 'ditch witch' micro-trenching digging tool;
- SIC has contracted out the installation of the fibre for the project. As such, a cost breakdown of different aspects of the project was not available at the time of writing; and
- As a competitive dialogue process is underway to select a private telco partner, the potential costs of the active equipment that will be required to provide an open access wholesale network have yet to be determined.

Cost and risk reduction measures

- SIC is using existing infrastructure to the greatest extent possible. Specifically, SIC is assessing the possibility of using publicly owned passive infrastructure ducts in the Lerwick area;
- SIC already owns a fibre network in Shetland which is used to service Council premises. This proposed core network will remain in the ownership of SIC and will be an extension of the existing network; and
- Micro-trenching technology is being used to significantly reduce the investment required in civil infrastructure.

9.7 Network architecture, services and competition

Network architecture

As this project is at implementation stage, the final architecture of the network was not known at the time of writing. However, SIC's requirements are such that the resulting architecture will be one of a backhaul network engineered with the capability of creating 'Digital Village Pumps' within the communities the network passes through.

Services

Wholesale

Open access active and passive wholesale services will be provided. The micro-trenching methodology being employed to lay fibre across the region provides up to 96 fibres in the cable. This suggests that there will be spare capacity which the SPV (or Shetland Telecom) will be able to offer on an wholesale basis.

The use of micro-trenching makes dark fibre services a more realistic option than duct access as a passive network service.

Retail

Due to the latent demand for adequate backhaul service, it is expected that all the major retail service providers will utilise the infrastructure, although no specific details of providers are yet available.

Competition

There is no directly comparable infrastructure in place in Shetland. It is expected that there will be limited investment by other providers in the next few years at least, although some interest has been expressed in using the new network.

9.8 Project summary and lessons learnt

Project Summary

The Interconnect Project is an example of the public outsourcing model. Shetland does not currently have a resilient fibre-based backhaul infrastructure, which is hampering economic development and making it vulnerable to network outages.

The Interconnect Project is seeking to address this issue and encourage the development of affordable high-speed broadband services for residents and businesses.

SIC acknowledged that private sector investment was unlikely and, together with ERDF, has funded a backhaul network linking Lerwick with the SHEFA 2 cable.

It is now looking to attract a private operator to manage the network, acting as a wholesale service provider and hopefully attracting other service providers onto the network.

Lessons learnt

- The state aid notification process needs to be properly executed as attempts to shorten the process by not addressing issues thoroughly are likely to lead to decisions being delayed;
- Seeking independent external advice on state aid is encouraged to ensure compliance/eligibility with respect to national broadband initiatives and funding activities; and
- It should not be assumed that the nature of the civil works required will exclude local contractors without previous telecoms experience.

10. Conclusions

To meet the challenging NGA objectives, partnership between the public and private sectors is necessary

Given the costs involved in implementing fibre optic based broadband, innovative financing and contractual models will be a necessity if the ambitious NGA targets are to be realised. The four PPP models described offer alternatives that involve varying levels of decision rights and commensurately appropriate levels of risk transfer. They are not the only solution. Other innovative approaches will no doubt be developed in the future. However, they do provide key insights and demonstrate approaches that have been successfully implemented.

PPPs offer wider benefits than simply financing

PPPs will encourage innovative approaches. They are also able to address the issue of migrating customers from slower, copper-based infrastructure. PPPs will help to ensure that networks are accessible and price levels remain competitive and fair. As the demand for access to digital data continues to increase exponentially, the increase in access speeds will be very welcome. Less populated and remoter parts of Europe should not have to face a 'digital divide'. The PPP models discussed in this article suggests that solutions are available to ensure that this does not need to occur.

NGA PPP contracts pose different challenges to PPPs in other sectors

It is much easier to predict demand and forecast growth for services in a mature sector, such as transport. NGA is a new service, and it is difficult to predict both the current demand and future growth. The NGA value chain is more complex and involves the setting-up of retail and application providers. It also carries a significant technology risk because the broadband technology chosen could be threatened by other technologies during the lifetime of the project.

Attitudes to PPPs also vary by country, depending on prior experience in using the mechanism and the market's appetite for risk.

PPP projects need to encourage innovation and a wide range of service providers

PPP projects need to provide an environment that encourages potentially competing providers to become wholesale customers of the PPP-developed network, and discourage the establishment of alternative infrastructure or a separate network. This means that the network must be open and flexible to enable innovation by service providers at price levels that are competitive and fair.

There needs to be a high level of certainty that customers will migrate to the new network. The threat from the copper network can be mitigated by incorporating the closure of the existing copper infrastructure as part of the PPP project. This requires the PPP to ensure that regulatory conditions supporting existing services are met, and the participation of the incumbent operator is needed.

Choosing the right wholesale access provider model

The wholesale access provider that sells access to the NGA network can be a pure wholesale access provider or the wholesale arm of an operator that also provides retail services. If the wholesale operator also has a retail arm, some form of separation is needed to ensure that conflicts of interest are avoided.

Gaining state aid support

State aid clearance is easier when there is private capital input into the project as it lowers the state aid intensity, which is a key measure used by the EC in assessing market distortion. State aid for NGA roll-out may be allowed if it will speed up deployment significantly compared to leaving deployment to the free market. The application process is lengthy, typically 2-3 years may be needed for the state aid application and procurement processes.

Funding and planning – taking a long term view

To attract the level of investment required to meet Digital Agenda 2020 objectives, it will be necessary to supplement governmental and EU investment with significant private sector investment. NGA PPP projects are most likely to be attractive to investors, such as pension funds, who are looking for low but steady annual return over a long period from a business with a steady cash flow.

The speed of network roll-out once the funds and contractors are in place depends on the size and complexity of the project.

11. Glossary of Terms

4G

4G stands for "fourth generation." It represents the next step change increase in data transfer speed from 3G which typically is limited to around 2 mbit/s compared to 4G technologies that can in principle deliver up to 100 mbit/s. The dramatic decrease in the time necessary to download data is expected to significantly change the functionality of the Internet, stimulating the expanded use of multi-media and cloud computing.

ADSL

ADSL stands for Asymmetric Digital Subscriber Line. A digital technology that allows the use of a standard telephone line to provide high speed data communications. Originally limited to 8mbit/s, the technology has since been upgraded in its improved version to deliver up to 24mbit/s.

Backhaul

In a hierarchical telecoms network, the backhaul portion of the network is the intermediate links between the core network and the small sub-networks at the "edge" of the entire hierarchical network.

Competitive Dialogue

Competitive dialogue is for use in the award of complex contracts where there is a need to discuss all aspects of the proposed contract with suppliers. Such dialogue would not be possible under open or restricted procedures. Procurement of public-private projects is often undertaken under a competitive dialogue.

CPE

Customer premises equipment refers to any handset, receiver, set-top box or other equipment used by the consumer of wireless, fixed-line or broadband services, which is the property of the network operator and located on the customer premises.

Dark Fibre

A dark fibre or unlit fibre is an unused optical fibre. Originally used when referring to the potential network capacity of telecommunication infrastructure, it now also refers to the increasingly common practice of leasing fibre optic cables from a network service provider.

DSL

DSL stands for Digital Subscriber Line. This is a family of technologies generally referred to as DSL, or xDSL, that use the twisted copper pairs used for traditional phone lines to deliver fast internet access and video-on-demand. Variants include ADSL, HDSL (high data rate digital subscriber line) and VDSL (very high data rate digital subscriber line).

Duct and Pole Access

The duty of telecoms infrastructure owners to give other telcos access to the poles, ducts, conduits etc. at nondiscriminatory rates.

EBITDA

Earnings before interest, taxes, depreciation and amortisation.

ERDF

European Regional Development Fund.

FTTB

Fibre to the building or Fibre to the basement. Fibre reaches the boundary of the building, such as the basement in a multi-dwelling unit, with the final connection to the individual living space being made via alternative means.

FTTC

Fibre to the curb. This is very similar to FTTN, but the street cabinet is closer to the user's premises; typically within 300m.

FTTH

Fibre to the home. Fibre reaches the boundary of the living space, such as a box on the outside wall of a home.

FTTN

Fibre to the node. Fibre is terminated in a street cabinet up to several kilometers away from the customer premises, with the final connection being copper. FTTN is often seen as an interim step towards full FTTH.

FTTP

Fibre to the premises. This term is used in several contexts: as a blanket term for both FTTH and FTTB, or where the fiber network includes both homes and small businesses.

FTTx

Fiber to the x is a generic term for any broadband network architecture using optical fibre to replace all or part of the usual metal local loop used for last mile telecoms.

GPON

A passive optical network (PON) is a network architecture that brings fibre cabling and signals to the home using a point-to-multipoint scheme that enables a single optical fiber to serve multiple premises. The GPON (gigabit passive optical network) standard differs in that it achieves higher bandwidth and higher efficiency.

HSPA

High Speed Packet Access, a mobile broadband technology.

IPTV

Internet Protocol television is a system through which TV services are delivered over the internet.

IRU

Indefeasible rights of use, a long-term lease of bandwidth.

NUTS

Nomenclature of Units for Territorial Statistics or nomenclature d'unités territoriales statistiques is a geocode for referencing the subdivisions of countries for statistical purposes. The standard is developed and regulated by the EU, and covers the member states in detail. It is instrumental in European Union's structural fund delivery mechanisms.

Local loop unbundling (LLU)

LLU is the regulatory process of allowing multiple telecoms operators to use connections from the telephone exchange to the customer's premises. The physical wire connection between the local exchange and the customer is known as a local loop and is owned by the incumbent local exchange carrier. To increase competition, other providers are granted unbundled access.

LTE

LTE stands for "Long Term Evolution," It is an approved standard for 4G mobile broadband using radio waves. LTE was developed as a long-term alternative to DSL, cable, and other wired forms of Internet.

MoU

Memorandum of Understanding.

NRA

Noeud de Raccordement d'Abbones, is a telephony distribution frame.

OLO

Other Licensed Operator, referring to a telephony operator company.

PoP

Point of presence, an access point to the internet.

SDH

Synchronous Digital Hierarchy are standardised multiplexing protocols that transfer multiple digital bit streams over optical fibres using lasers or LEDs.

VDSL

Very high bit rate digital subscriber line is a digital subscriber line technology that provides faster data transmission over a copper wire and coaxial cable. VDSL is capable of supporting applications such as high definition TV as well as telephone services and general internet access, over a single connection.

VoIP

Voice over Internet Protocol. The technologies, methodologies, communication protocols and transmission techniques for the delivery of voice communications and multimedia sessions over internet protocol (IP) networks, such as the internet.

White areas

Defined by the EC as areas where high speed Internet networks do not at present exist and where they are not likely to be built and be fully operational in the near future (within 3 years).

WiMax

WiMax stands for "Worldwide Interoperability for Microwave Access." It is an approved, fourth-generation mobile broadband technology that seeks to emulate the functionality of wireless Internet but using mobile phones.



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