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# CASE STUDIES COLLECTION

FTTH COUNCIL EUROPE — February 2016

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# Andorra Telecom

## Small country, FTTH world leader

Andorra's commitment to universal ultra-fast broadband for all citizens has paid impressive dividends over a short period.

The Principality of Andorra and its deployment of FTTH demonstrate what can be achieved in short order with a strong vision and the right level of commitment. The mountainous country has a population of only 75,000, but without enjoying any of the economies of scale of a larger economy it has become a fibre access example for the rest of Europe.

In 2007, the company carried out two small pilots, to test the processes involved as much as the actual technology: "Deployment began early in 2008, and was completed in May of 2010," he recalls. "It was a 100% horizontal deployment, although there are still some large residential buildings to be connected."

### General Information

#### Infrastructure owner:

Andorra Telecom, a full service (including fixed, mobile, TV and Internet) network operator.

#### Location:

The network covers the Principality of Andorra.

**Network status:** Operational

When the country's incumbent telco Andorra Telecom, its only provider of communications services, decided in 2006 to improve the services available to citizens, it soon arrived at FTTH as the best way to meet its ambitious targets.

"We wanted to improve the services available to people, and our revenues at the same time," says Jaume Salvat, CEO of Andorra Telecom. "We're a broadcaster too, so that meant premium TV services over the same network. ADSL was not sufficient for that purpose, so we decided instead to invest in future-proof infrastructure. We wanted a long term approach, to minimise impact and allow better and more innovative services, while lowering operational expenses."



What followed was a commitment to provide Internet access over optical fibre as a universal service, to all final users, in any populated spot, in any geographical situation in Andorran territory, at a reasonable basic price and with 100 Mbps symmetric speed of access.

"Fibre comes at a higher initial Capex, but comes with big advantages that made it the only option," explains Salvat. "We recognised that it would enable us to move from being a traditional telecoms operator to a much more service-focused one."



Subscriber penetration rates, in May 2012, were running at 37.69% of all Andorra's 52,000 households, rising to 52.97% when only measuring households inhabited full time, as opposed to second homes. (see box below for full figures).

### Deployment

#### Size of network:

High speed broadband is universally available to all Andorra's 75,000 population.

#### Penetration:

Total number of households in Andorra: 52,000.

Households passed: 100%

Total number of inhabited households: 37,000 (rest are holiday homes).

Penetration of inhabited households: 52,97%.

Penetration of total households (holiday/inhabited): 37,69%.

Households connected at full 100Mbps speed: 18,050 (the remainder are connected, free of charge, at a lower speed pending an upgrade).

**Technology/architecture:** FTTH

**Deployment method:** Ducts.

## Tough challenges

"We have faced the toughest challenges possible on this deployment," claims Salvat. "The only advantage has been the small size of the country. Otherwise we have enjoyed none of the economies of scale of a larger deployment, and terrain that is very mountainous. Around 50% of people are in the two biggest cities, and the rest in small towns. It's complex."

## Business Case

### Investment:

No public subsidy for the deployment, everything paid for by Andorra Telecom

### Number of years to ROI: 7

### Business model:

Increasing penetration of the FTTH network by providing products adapted to every segment of the market. New services on FTTH network only. Consolidation of backbone technologies and service platforms.

Meeting these challenges, he says, was more than just a technical matter: "The company has also had to go through major evolution," he explains. "We are no longer just focused on delivering basic connectivity. We have changed how we do business, and are based more around services now. That's been the challenge – not the technology but getting the company ready, and adapting mindsets of people who had in many cases been working for us for a long time."

He explains that Andorra Telecom's unusual regulatory



position has also influenced the project: "What we want to provide is an attractive service at a good price to 100% of households," he says. "In a country of our size, that won't be achieved through competition. At Andorra Telecom, we build, operate and provide services. We're a mobile operator too, ready to move to 4G."

He says that his priority now is concentrating on developing services for the new broadband network, for example in the area of Internet TV: "We provide IPTV, and can allow consumers to take calls on their TV if they like," he enthuses.



"The call pops up on screen and you can choose whether or not to answer. There are other interactive services, like white and yellow pages and weather information. We're going to be developing more and more bundles for customers."

Andorra Telecom, he says, wants to get rid of all of its legacy copper network as soon as possible, as it is an added expense to run two networks side by side.

## End-user Services

### Services:

60% of subscribers take a triple play bundle, costing 69 Euros, and 40% take a double play bundle, costing 49 Euros.

Fortunately, in most cases, consumer response to FTTH has been very strong, helping to make this ambition realistic: "We can show clearly that fibre is better – even if a lot of people only have a holiday home here and don't want anything more than a telephone," says Salvat. "People have generally been very enthusiastic, realising that 100Mbps symmetric offers clear advantages. Once you offer a certain level of service, it becomes like a commodity and people start to expect more, so we have to keep on developing new services at a lower price. We have some very demanding customers."

He says that in addition to consumer satisfaction, it is becoming strategically advantageous for companies to locate in Andorra: "I see a lot of jobs being created in the future," he believes. "We have made an up-front investment that is going to pay back commercially and in terms of people's quality of life. There is no doubt we made the right decision."

Written in March 2011, updated in August 2012  
Photos provided by Andorra Telecom  
Contact us on [info@ftthcouncil.eu](mailto:info@ftthcouncil.eu)



# ARGE Glasfaser Waldviertel

## Austrian villages build their own FTTH network

FTTH isn't just for big cities. A trio of small market villages in the northeast of Austria have installed a community-owned fibre network that is breathing new life back into the region.

The story begins in 2003 when community leaders recognised that they had a problem of high unemployment and a declining population. Located near the Czech border, near the former Iron Curtain, the region had gone into sharp decline since 1945. In one of the towns, St Martin, the number of inhabitants had fallen from 2,500 to just 1,250. To slow the exodus of young families and businesses from the region, the three mayors decided to modernise the communications infrastructure.

At the time internet access in these towns was only possible

with work starting in 2005, then St Martin, with the timetable determined by the planned sewer work. And in 2009 network construction started at the resort village of Bad Großpertholz. Today the fibre network passes more than 650 homes and small businesses, of which around 250 are receiving services over the network (June 2010 figures). The aim is to reach all 1,500 homes and 150 small businesses in the three communities by the end of 2011. And that may not be the end – other nearby villages are interested in connecting to the network.

Ironically, the biggest challenges were due to the small size of the network. The first problem was finding an operator to offer services on the network. National internet service providers weren't interested in doing business because of the small number of subscribers. In the end the three municipalities joined forces with a regional ISP called WVNET to form an independent company that now operates the active equipment on the network and offers broadband and VOIP services.

The towns also wanted to offer IPTV services, but standard IPTV solutions were too expensive for such a small number of subscribers. Again, they solved the problem with a bit of lateral thinking. They installed an IPTV system designed for use in large hotels, which was much cheaper. Of course, the solution isn't scalable to many hundreds of thousands of households, but for a small, regional network, it suits their purposes perfectly.

### General Information

Country: Austria

Towns: Großschönau – St Martin – Bad Großpertholz

Project name: ARGE Glasfaser Waldviertel

via dial-up or ISDN connections. The incumbent operator, Austria Telecom, was not planning to serve small communities with ADSL, and the alternative operators were not interested either. So the mayors decided to take matters into their own hands by laying fibre-optic cable to every property.

Thus ARGE Glasfaser Waldviertel was created, which translates roughly as "Forest Quarter Fibre Co-operative". Each municipality owns its own duct and dark fibre, but by working together the three towns have been able to share knowledge, experiences and gain economies of scale.

The project was able to take advantage of planned work on the sewage system to install ducts for a fibre network in the same trench as the new sewer pipes. Since civil engineering work is



usually the most expensive part of this type of infrastructure project, this made it possible to reduce costs substantially – the total cost of the network is under €1 million.

Großschönau was the first village to get fibre connections

### Deployment

#### Size of network:

650 homes passed, 250 subscribers [June 2010]

#### Technology/architecture:

Active Ethernet with four virtual LANs per customer

#### Deployment method:

Duct installed during sewer refurbishment

#### Time to deploy:

Installation started in 2005, due to finish 2011

The network is set up as an Ethernet LAN, which allows consumers and local businesses to connect to each other at 100 Mbps for free. The IPTV server also has space for regional programming, where local residents can upload videos of local events and celebrations and then others can view the videos in the same way as regular TV content. Local farmers helped to lay more fibre between the three towns so that the three communities could network with each other.

Despite having 100 Mbps between locations on the network, it was difficult to get a reasonably priced high-speed connection to the internet exchange. The initial price quoted was more than €4,000 per month for 2 Mbps. Competition has brought prices down, and today it is possible to get 60 Mbps for the same

price as 2 Mbps just four years ago – a big improvement, but still not ideal.

And while big service providers didn't want to offer services over the new fibre network, they were only too happy to compete. Suddenly, after the first customers were connected, Telekom Austria decided to bring ADSL to

## Business Case

### Investment:

Less than €1 million to connect 1,500 households (exact numbers not available).

### Business model:

Active sharing (active equipment and services provided by same company)

### Network owner:

Each village owns its portion of the network.

### Network operator:

ARGE Glasfaser Waldviertel, which is owned by the three villages and local ISP WVNET.

the towns of the region, and a small wireless ISP owned by the power utility company started offering services locally. "The interesting thing was that a lot of the people in the municipalities said 'It's nice that Telekom Austria and EVN suddenly come and offer us something, but we are no longer interested because we have our own network'," said Peter Höbarth, Mayor of St. Martin.

Students are returning home to study, thanks to the availability of fast broadband connections. Local businesses are able to collaborate effectively and share computer servers to keep costs down. The municipal authorities are taking advantage of the fibre network to improve local services, such as control of street lights and flood warning information.

The fibre network is also creating new opportunities. In Großschönau, for example, they have built the first "passive house" village in Austria, which is a centre of excellence for low-energy housing. The village contains a training centre, research laboratories, an exhibition and a show home where prospective home owners can "try before they buy". All the houses are connected with fibre, so that



energy consumption can be monitored remotely and the researchers can collaborate with their colleagues at the University of Vienna.

"The network has created a special regional feeling, and is helping to boost the local economy. You cannot see it in clear numbers at the moment because the project is too young, but you can see it in how our municipalities present themselves and how they start to prosper," commented

## End-user Services

### Service providers:

WVNET is the only service provider on the network at present; it is making technical preparations to offer wholesale bitstream services to other service providers.

### What's the cost?

Several different packages are available, ranging from entry level to business user. GDSL Classic is a mid-range package with 8Mbps/8Mbps symmetric broadband for €39.90/month, cheap by Austrian standards. 100 Mbps service between local addresses on the network and IPTV are included for free. There is a one-off installation fee of €199.

Latest tariffs available at: <http://www.arge-glasfaser.at>

Martin Bruckner, Mayor of Großschönau.



From left: Peter Höbarth, Mayor of St. Martin  
Manfred Artner, Mayor of Bad Grosspertholz  
Martin Bruckner, Mayor of Gross Schoenau

Written in August 2010  
Contact us on [info@ftthcouncil.eu](mailto:info@ftthcouncil.eu)

## A fast-emerging brand in Denmark's fibre-access sector

**FTTH company Wao! is one of the leading names in Denmark's rapidly developing superfast broadband market.**

Wao! was established in 2010 as a product and marketing house on the fibre-access networks of 15 (two of which today have merged to one) of Denmark's largest energy companies. Wao! is now a well-recognized brand up and around the country, the constituent networks together reaching more than one in three Danish homes with superfast fibre-based Internet, television and IP-telephony services.

### General Information

#### Infrastructure owner:

The FTTH networks managed and marketed by Wao! are all still owned by the utility companies that built them.

#### Location:

Various locations around Denmark, particularly concentrated in Jutland, Funen, North and South Zealand, Lolland and Falster.

"By the end 2013 there will be around 2 million households in our coverage area, and we have passed nearly 900,000 of these with fibre," says Wao! CEO Joergen Stensgaard. "We have around 300,000 households actively using the network, and the number is still growing fast."



Wao!'s main role is developing and marketing products to run on the combined networks of the 14 utilities, a job formerly managed by three different companies. Since 2010 Wao! has been operating its own FTTH network in Copenhagen, but in 2012, Wao! transferred the network to one of the utility companies – thereby closing a three year streamlining process – and it is now completely focused on wholesale to the utility companies.

"We have established a brand and streamlined our operations across three main product types – TV, VoIP



and Internet," says Stensgaard. "In this process we have had to unify three different systems. The result has been cost reductions and improvements in quality. Calculated as revenue generating units, we expect to end this year with 550,000 RGUs on TV, Internet and IP-telephony. We have been moving fast, and we have been able to expand customer numbers because of the effectiveness of having one brand and one portfolio. That has had a significant impact and has made it possible for us to reduce the cost per product by 64%."

### Business Case

#### Investment:

No public subsidy for the deployment, with all infrastructure paid for by network owners.

#### Number of years to ROI:

Each network-operating utility has its own business case.

#### Business model:

Wao! is a product and marketing service provider. The networks it manages are owned by utility companies that buy services from Wao!.

Continuing its aggressive strategy, Wao! has reached out for new market segments by launching successful triple play products to the strong Danish housing associations, which holds a potential of some 700,000 households.

Another reason for Wao!'s speedy headway in a competitive market, explains Stensgaard, has been the competitive pricing of its services, particularly against non-fibre alternatives. "Our lowest speed of connection is a symmetrical 50Mbps offer, starting at the equivalent of 24 Euro a month," he says. "This is a good price compared to other services on the market, positioning us as having not so much the cheapest broadband on offer but certainly the best quality, the highest upload and best price performance in terms of price per megabit."



“In addition to this we are the only Danish content provider to offer a speed warranty on our entire Internet portfolio. Our customers always get at least the speed they pay for. We deliver the best quality of broadband service in Denmark, and for the second year in a row that position has been documented by an independent survey among 3,000 Danish broadband costumers. The message is clear: Waoo! is the undisputed leader on stability, price-value and satisfaction on expected delivery of speed.

## Deployment

- **Network availability:** By the end of 2013 the networks together will pass more than a third of Danish households, nearly 900,000 out of 2 million in their joint catchment area. Today there are a total of 2.6 million households in Denmark.
- **Penetration:** Around 300,000 households are actively using the network.
- **Technology/architecture:** FTTH in either a PON or point-to-point configuration, depending on the utility operating the network.

Stensgaard says Waoo!’s competition includes ADSL from Danish incumbent telco TDC, which reaches 80% of Danish households, as well as coax networks from the country’s cable companies, which cover around half the population: “We offer way better speeds than these, and can’t be matched at all by DSL,” he says.



The future development of the physical network remains the responsibility of the individual utility companies, he explains: “These are owned by Danish citizens, in other words the consumers of the services,” he says. “The aggressiveness of future rollouts will depend on the individual region in question.”

Stensgaard says there are elements to the Waoo! set up that mark it out from many other FTTH deployments: “No public money has been put into the rollout, only investment from private business,” he explains. “Another major



advantage we enjoy is being owned by utility companies. They are accustomed to investment plans that run over a long period. A long-term approach to return on investment is important to the success of this type of operation.”

## End-user Services

### Services:

Most subscribers take a triple-play bundle of TV, telephony and Internet services. Waoo! is Denmark’s largest IPTV service provider.

### Pricing:

Basic Internet connectivity starts from a lowest speed of 50 Mbps for the equivalent of € 24 a month. The highest speed of connection is 1 Gbps – accessible as part of projects in the northern part of Jutland, where complete villages have been chosen as test grounds for digital living.

So what happens next? Stensgaard says he expects continued rollout of the networks, increased penetration of services and the development of more products, but also more competition: “Our Danish competitors have finally understood the need for higher speeds and quality. But our Internet product is still unchallenged, the best on the market, and the still-increasing use of high-quality streaming will give us a huge advantage. For instance, this fall we launched a partnership with Netflix – one of the first of its kind – to provide super high-quality Internet TV from Netflix on our TV box and the fibre-network. We have put significant efforts into developing our services according to the new demands for à la carte television and On Demand and Web TV for all our broadband customers. This service means that all our customers can choose to get their television entertainment directly over the Internet without having to buy a cable TV package,” he says. “Thus, our effort is continuously to improve the quality of our main products while developing a more personalized service offer in the line of waoo.tv. I see the future as exciting for us, but I would not say necessarily easy. At least our services are based on a future-proof endgame technology.”

Written in May 2011 / Updated in December 2013  
Photos provided by Waoo! and Danish Energy Association  
Contact us on [info@ftthcouncil.eu](mailto:info@ftthcouncil.eu)

## Ostrobothnia is leading Finland's rural Fibre

### Regional Council drives the roll out of FTTH

The region of Ostrobothnia is situated on the West Coast of Finland, with the bilingual city of Vaasa as its centre. It consists of 15 municipalities and is widely known for its natural beauty.

In December of 2005, the Regional Council of Ostrobothnia adopted a broadband strategy that aimed to enable symmetric 100 Mb/s - 1 Gb/s connections for households within five years. The network was to be open, allowing every service provider access on equal terms, and giving each consumer the option to select his or her own preferred services. The network was realized through a significant partnership where the inhabitants and the municipality were equally involved.

### Availability of High-Speed Broadband in Finland\*

"The availability of fixed broadband lines was the densest in the provinces of Kymenlaakso and Pohjanmaa (Ostrobothnia) where about 72% of permanent residences were within the availability area of the high-speed broadband network. The best availability of optical fibre lines was in Pohjanmaa (Ostrobothnia) (55%) and Uusimaa (45%)."

Municipalities ranked according to the availability of optical fibre network. Among the 10 highest-ranking, six are located in Ostrobothnia:

1. Utsjoki
2. Pietarsaari – Jakobstad (Ostrobothnia)
3. Pedersören kunta - Pedersöre (Ostrobothnia)
4. Uusikaarlepyy - Nykarleby (Ostrobothnia)
5. Luoto – Larsmo (Ostrobothnia)
6. Loviisa - Lovisa
7. Kristiinankaupunki - Kristinestad (Ostrobothnia)
8. Kumlinge
9. Lapinjärvi - Lapträsk
10. Vaasa - Vasa (Ostrobothnia)

*\*Finnish Communications Regulatory Authority (July 2013)*

### Looking forward

"Although we had no problem with ADSL first-generation broadband in 2000, we could see that there would be need for a next-generation network in the future," explains Ulf Grindgärds, who has been working on the region's IT-infrastructure since 1999. As Special Planner, he is responsible for implementing the Regional Broadband Strategy.

In 2003-2004, getting an ADSL connection in Ostrobothnia was easy, thanks to very good telco networks. For this reason, it was very challenging to get all the parties to understand why we should start planning for FTTH. The common view was: "Why invest in FTTH when we already have all the necessary services available?"

But precisely because households in Ostrobothnia were early adopters of first-generation broadband, Ulf thought it might actually be easier for them to understand the need for more bandwidth in the future. The Ostrobothnia Regional Council adopted a common umbrella-concept for constructing the next-generation network. First, FTTH projects were founded at municipality level, in several municipalities across the region. The first step at that level was to form a working group, which started up a six-month mobilization and planning project financed by the Regional Council.

### Involving the community

"Everyone in each village or town was involved, creating the most accurate picture of local circumstances and requirements possible," says Ulf Grindgärds. "After the information phase, in which people are also told what the cost will be, pre-connection agreements are drawn up, to see whether the required penetration and investment level can be reached. After recalculating to establish a price based on these pre-connection agreements, binding agreements are drawn up and the decision to build the network is made. If necessary, a community-based company - cooperative - is founded."

A community-based local FTTH-project in the municipality of Kristinestad provides a perfect example. In December 2006, the Cooperative KrsNET was founded by 30 inhabitants, after following the planning and mobilization process described above. The municipality of Kristinestad played an active role in starting up the process, but is now a 'regular' member of the cooperative. Before the roll out in a village could start, a penetration level of some 40% needed to be





guaranteed in advance, in order to keep the connection fee manageable. Network roll-out started in June 2007, and the initial phase with pioneering households, enterprises and the municipality continued until 2008. The connecting network (backbone) measured 140 km and contained some 15 active nodes. Soon, 450 homes were activated, the first Internet Service Provider was in place and the municipality had connected all its schools and other buildings.

## Deployment

FTTH networks in Ostrobothnia:

### Open FTTH networks (6):

- Kristinestad (Coop Krs-NET)
- Närpes (Dynamo Net Ltd)
- Malax (Bothnia Broadband Ltd)
- Nykarleby (Coop NuNet)
- Pedersöre (Coop Pedersöre Open Fiber)
- Kronoby (Coop KNT-NET)

### Closed FTTH networks (3):

- Anvia Ltd (Vasa region)
- JNT Ltd (Jakobstad region)
- TeliaSonera Ltd (The City of Vasa)

“During the expansion phase, certain European Projects provided subsidies, which were dedicated to facilitating the backbone part of the network to the smallest villages – those without a village school” says Ulf Grindgärds. “The construction cost is also covered by the connection fees, which amounted to EUR 1,700 - 3,000 per connected house during the first phase of construction. This connection fee is paid in three installments and each household is offered the possibility to take a loan in local banks. During the current expansion phase, KrsNET decided to introduce a single EUR 2,500 connection fee everywhere in the municipality.



### Widespread backbone

The municipality of Kristinestad is widespread, with many villages and an old, small town (1649) at its centre. Today, just about every household in the whole Kristinestad area can access an FTTH connection - even in the smallest villages. The widespread backbone and connection points made this



possible, from the year of 2009 onwards. Point to point Ethernet was considered the most future-proof option for the network. The backbone is constructed by jetting, with micro cable being blown through the tubes after they have been installed. The houses are connected with blow fibre.

The business model for KrsNET is open access and the network owner offers no services of its own. Today, some five service providers compete on the network and offer Internet, IPTV and VoIP. Companies can have their own VLANs, if required. “Today, we have about 700 activated connections in KrsNET,” states Ulf Grindgärds. “The most important next step is to sell more connections and get more households connected. It is also vital to speed up cooperation with similar neighboring open-access networks. Today, KrsNET is connected to several other networks. For the networks, this is better, as we get more services, more service providers - and more competition!”

Today the availability of FTTH in the municipality of Kristinestad is 80%. About 20% of the homes are connected.

“The big difference in comparison to ADSL is that anyone can buy an 100 Mb/s Internet connection for about EUR 22 a month. IPTV is particularly popular amongst end users, who are delighted with the network.”

Written in April 2011 / Updated in December 2013  
Photos provided by Ostrobothnia Regional Council  
Contact us on [info@ftthcouncil.eu](mailto:info@ftthcouncil.eu)

## Successfully Bringing Fibre to Rural Finland

**Municipality-owned network, available to ISPs at no cost, enables rollout and socio-economic boost for region with population density 87 % below European average**



The EU population density average is 117 people per km<sup>2</sup>, but in Finland's Suupohja County it is 8.8. The 5000 km<sup>2</sup> region has just over 55 villages, with between 50 and 500 inhabitants each, and eight municipality centres. Several municipalities founded Suupohjan Seutuverkko Oy (SSV), a non-profit limited company in 2005. Originally five owned the shares; today this number has grown to seven. This has allowed them to bring fibre connections to homes, institutions and businesses across the region.

### General Information

**Location:**

Suupohja County

**Population:**

44,000 people

**Infrastructure Owners:**

Suupohjan Seutuverkko Oy (SSV) owns the passive and active infrastructure and handles maintenance

**Service Providers:**

Any ISP has free use of the open-access network

"In 2004, over half of these villages didn't have broadband," explains Anne-Mari Leppinen, Project Manager with the Suupohja Region ICT Economic Development Agency. "None of the national telcos were willing to invest in the area, and local municipalities were paying a great deal of money to rent copper connections. They wanted to cut costs but also strengthen co-operation and enable future services. The idea arose to build a municipality-owned fibre network to public places and villages. The company's original idea was to use existing copper infrastructure in the last mile by installing digital subscriber line access multiplexers (DSLAMs) in the village telephone centres. However, the strategy changed during the first year and they decided to take fibre all the way to the houses. This change was the result of major changes in the legislation, which led to a

price jump for rural copper. First, trunk connections to the municipality centres were made. This was followed by network extensions to built-up areas and villages by leading optical fibre connections all the way into the houses. The initiative was paid for by combining a bank loan, guaranteed by the municipalities, with national funding and a one-time connection fee of €1,500."

### Deployment

**Size of network:**

5000 homes passed (50 % of all homes); 2500 subscribers (15 % — 60 % of all homes, businesses and public centres depending on the municipality)

**Time to deploy:**

2005—2013 and continuing

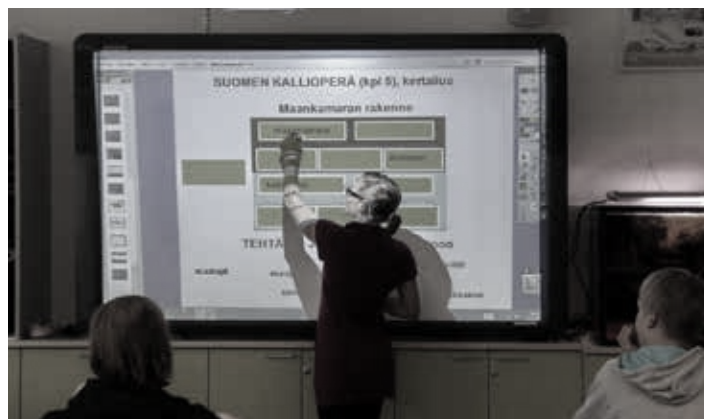
**Deployment method:**

Open-access network

"Now, all the villages in the area share their own FTTH-network which is open to anyone. Many customers in small villages are already using 150 Mbit/s symmetrical connections. Over 2000 households and businesses are equipped with an FTTH-connection and all the public spots, such as schools, hospitals, libraries and day care centres, are linked with fibre. The total length of the network is over 1500 km and the current speed of the backbone is 10 Gbit/s. The trunk line of the SSV network forms a loop in the area of five Suupohja municipalities and three Satakunta municipalities. The line runs through the built-up areas of Kauhajoki, Isojoki, Karijoki, Teuva, Karvia, Kurikka and Siikainen and Honkajoki. Along the way it branches out into village networks."

### Revitalising the countryside

"Bringing fibre to all the villages in Suupohja County has introduced many new options for community work, businesses, education, health care services and





entertainment. Ultra-fast Internet connections have made it possible for people as well as businesses to survive in the countryside, and the regions is now more attractive for people to stay. IPTV services have improved the poor TV quality in some areas, and the network has also improved the 3G/4G-coverage."

The network also increases the value of houses, boosts GDP, allows better quality of life and brings many new services. Some examples: medical facilities can now send X-rays to the regional hospital for analysis. Mayors meet through videoconferencing. In the village of Kauhajoki, school surveillance and access control is taken care of with fibre. Each classroom is equipped with smartboards and document cameras. Students are already using electronic books in some classes and use their smart phones, tablets and laptops during lectures. Schools can now also hook up to a countrywide web-based student information system, which allows students and their parents to look up schedules, exam results and grades as well as communicate with teachers.

## End-user Services

### Price per package:

Some examples:

- 50 Mbit/s symmetrical Internet: € 12.20 /month
- 150 Mbit/s symmetrical Internet: € 22.10 /month
- IPTV: € 5/month

Plus an additional € 24.80/month to SSV

### Types of services:

Triple play, surveillance, LAN-to-LAN for companies; it is expected all services will be delivered via Internet in future

Fibre allows people and businesses to remain in or move to the area. One couple quit their jobs in Tampere, Finland's third largest city, and set up their bookkeeping business in the region. All their files are on the cloud, so the business is totally dependent on the network. Municipality-owned business parks for SMEs can now offer more than office space. Ultra-fast Internet brings easy access to financial administration and secretarial services, along with video conferencing, a direct fibre data centre connection and private cloud services. SSV now also offers software developers and device manufacturers a test bed where they can test their products and obtain feedback from end users.

### Free fibre for ISPs

"The rollout had its share of challenges," says Anne-Mari. "DSLAM hardware orders were delayed for six months while the national regulator eased regulations concerning the copper rent. Copper network owners were able to charge different rates in

different regions. This only strengthened SSV's resolve to take fibre as close to the end user as possible!"



"SSV handles building and maintenance and owns the passive and active infrastructure. SSV are the first entity in Europe to allow service providers to use their network for free. The reasoning is that this decreases end-user prices, increases quality, stimulates competition among ISPs and allows them to focus on services instead of infrastructure development. FTTH customers are totally free to select (and change) their ISP from a variety of choices, from large multinationals to local start-ups. End users pay the service providers for Internet, IPTV and other services, and also pay a fixed network fee to SSV for infrastructure maintenance."

## Business Case

### Business model:

Suupohjan Seutuverkko Oy (SSV) is a non-profit limited company owned by seven municipalities in Western Finland. The purpose of the company is to build and manage FTTH networks.

### Investment:

The initiative was paid for by combining a bank loan, which was guaranteed by the municipalities, national funding and a one-time connection fee of €1,500/customer. Total investment/cost: € 10,100,000.

### Numbers of years to ROI:

8-10 years, per financial calculations

## Looking ahead

Next steps are to get all households connected and start pitching the region as a logical place to build data centres, as the climate is cool and the location secure. The Suupohja Region is also part of the EU project ENGAGE, established last year, and is currently working with 11 different partners from nine member states to effectively brainstorm on the best way to get fibre optic networks to the countryside across Europe.



Written in November 2013

Photos provided by SEK

(Economic Development Agency of Suppohja regions)

Contact us on [info@ftthcouncil.eu](mailto:info@ftthcouncil.eu)

# Pau Pyrenees

## Pioneering fibre deployment in South West France

The municipal authority of Pau-Pyrenees is looking forward to a new generation of high bandwidth services for its citizens and businesses.

On the northern edge of the Pyrenees is the town of Pau, capital of the *Pyrénées-Atlantiques* department of France. Along with 13 other neighbouring municipalities, it forms the *communauté d'agglomération* of Pau-Pyrénées.

In 2001, the municipal authority of Pau-Pyrenees decided to radically transform the local economy, as well as improve the lives of citizens, by deploying a pioneering optical fibre network running directly into homes and businesses.

### General Information

**Location:**

Pau and surrounding area, South West France.

**Population:**

Total population of the area is approximately 140,000.

**Network owner:**

Agglomération of Pau-Pyrenees

In those days, fibre to the home (FTTH) was in its earliest infancy, with little in the way of other projects to use as a template. Not only were there no clear standards for project planners to follow, there was little understanding at subscriber level of what high speed broadband technology could deliver. The 'dotcom' crash was a recent memory, and people's faith in the power of the Internet to transform lives at a low point.

Undaunted, the Pau-Pyrenees authorities began work in 2003, and the network was launched two years later in 2005, based on Active Ethernet running over fibre. By 2007, 42,000 homes had been passed – although only 5,000 active subscribers

were signed up.

The perception started to grow that a major investment had been made in a network that only a minority of people really wanted, much less needed. Services envisaged by network planners like video on demand, video surveillance, high definition TV, online backup of data, green data centres, grid computing as well as the idea that applications could be hosted remotely were all but unknown, and people were not ready for them.

### Deployment

**Size of network:**

51,000 homes passed, 9,000 homes connected (as of summer 2010).

**Technology/architecture:** Active Ethernet running over fibre

**Time to deploy:**

Pre-planning 2001, project started 2003, finished and launched 2005.

Efforts to communicate the ways in which the network could be of benefit, and explain how FTTH technology differs radically from broadband alternatives, made slow progress. A lack of competition at service provider level, and consequent lack of spend on marketing and the development of new services, did not help matters. The pioneering Pau-Pyrenees project started to develop a bad image, and its credibility was in doubt.



## A change in fortune

Three years later, the fortunes of the Pau-Pyrenees FTTH deployment have undergone a dramatic improvement. The original objective of 55,000 out of a possible 70,000 homes passed has, at 51,000, been nearly reached. Subscriptions have been taken up by over 9,000 of those homes, as well as 350 locally based businesses, and interest is clearly rising.

## Business Case

### Investment:

Project cost of €14.8M (split €6M Pau-Pyrénées agglomération, €7.7M FEDER, €1.1M Aquitaine Region). Average cost per home passed of under €300.

**Owner:** Pau-Pyrenees owns the network.

### Operator:

Axione operates the network, responsible for design, engineering, installation, operation, and maintenance, with services sold through ISPs like SFR-Cegetel and Heliantis. Now open to competing telcos, in line with ARCEP (French telecom regulatory authority), to assist future network development in less densely populated, rural areas.

The impact on the local economy and on quality of lives is now no longer in doubt. Since 2005, over 800 new jobs have been created through the economic uplift delivered by FTTH. The region has become highly attractive for businesses to settle in and build new offices, or establish data centres. In particular, *Pau Cité Multimédia* is being created to attract companies with an ICT focus.



"It is difficult to measure the real impact of the network, but we expect ultimately that about 1,600 new jobs will be created on these sites," says Martine Lignières-Cassou, President of the *Communauté d'Agglomération* of Pau-Pyrénées.

The University of Pau has developed digital streams for the benefit of students, 1,450 of whom will soon be directly

connected to the Internet over fibre broadband links. The prestigious Ecole Internationale des Sciences du Traitement de l'Information (EISTI) now has a campus in Pau, drawn by the boon of high-speed connectivity.

Those residents that subscribe to FTTH are enthusiastically enjoying highspeed access to services like VoIP, IPTV, VOD and online photo development. Such services have started to filter into the consumer mainstream, and now appear far less cutting edge than back in 2005 when the deployment was launched.

Businesses meanwhile are benefiting from a better quality of connectivity than they would enjoy even in a major city, enabling them to decentralise and move jobs into the region.



Small companies are able to achieve a more global reach with their goods and services. The future now looks bright with a whole new generation of services soon to become a reality – online gaming and virtual worlds, telemedicine, teletraining, virtual world-based e-commerce.

"Ours remains a pioneer project, and many other communities have since sought to take account of our experience," says Lignières-Cassou. "They want to avoid problems and learn about techniques, such as deployment in urban areas and the combining of several municipalities. Pau was not only a technological challenge, but above all a social challenge and an economic one."

## End-user Services

### Cost:

A 70 Mbps connection with triple-play services costs €34.9 per month.

A number of businesses also benefit from high upload and download speeds, as well as public sector services, for example medical imaging uploaded on a joint network shared by several hospitals and surgeries.

She says the organisation is currently at work on defining a services offer for the passive network: "We are also developing the active side to maximize the potential of fibre, using our competitive advantage with the deployment of innovative services," she adds. "Our responsibility now is to consolidate the network, and strengthen the ICT pipeline, and also to share our experience with local authorities and public sector partners wishing to take advantage of very high speed broadband."

Written in April 2011  
Photos provided by Pau Pyrenees  
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# Pays Chartrain

## French utility extends the reach of fibre access to digitally disposed rural communities

**Régie Syndicat Electrique Intercommunal Pays Chartrain (SEIPC) builds a FTTH open access network covering more than 70 municipalities with 18 service providers in Pays Chartrain and Eure-et-Loir.**

*Syndicat Electrique Intercommunal Pays Chartrain (SEIPC)* has been in operation for over 80 years, providing electricity services for 71 municipalities South of the French cathedral town of Chartres. The municipalities between them have a population of around 190,000 people, largely rural.

### General Information

#### Infrastructure owner:

Syndicat Electrique Intercommunal Pays Chartrain (SEIPC) owns the network, which is operated by an affiliate organisation, the Régie Intercommunale.

#### Location:

The network initially covered 71 municipalities in the Pays Chartrain, an area South of the city of Chartres, but now takes in other locations in the Department of Eure-et-Loir.

#### Network status:

Operational, and continuing to expand.

#### Service Providers:

A total of 18 service providers use the Céliéno network.

Around 75% of the region's electricity network is underground, and for much of its length is coupled with telephone cable. As long ago as 1997, the SEIPC started to look into the feasibility of upgrading its communications network to meet the needs of the digital age.



To push plans forward, a separate entity was created, the *Régie Intercommunale*, which had the aim of modernising network infrastructure across the region.

In 2005, the SEIPC undertook a technical and economic study, focusing particularly on the remoter parts of the region where needs were being least met. It became apparent that optical fibre delivered directly to homes and businesses was the only way to meet all these needs.

In 2006, the *Régie Intercommunale* set about planning a coherent strategy to bring fibre to the whole of the Pays Chartrain, resulting in the Céliéno network, which continues to be developed and implemented. Operated on an open access basis, it is available to a number of telecoms service providers to develop offers for homes and businesses.



### Increasing coverage, growing support

The remit of the *Régie* has grown to embrace not only the municipalities covered by the SEIPC, but also a significant number of other municipalities outside that territory. The Céliéno network has thus won lasting support from around the Department of Eure-et-Loir, where it has helped to connect many rural communities.

### Deployment

#### Size of network:

The Céliéno network covers 25% of Eure-et-Loir, and within this region is available to 90% of 4,500 homes.

#### Technology/architecture:

passive infrastructure (fibre, twisted pair, powerline).

**Network speed:** up to 100 Mbps – 1Gbps.

The mission of the *Régie Intercommunale* has broadened in other ways, now encapsulating, in addition to the interconnection of various municipal fibre networks that cover the region, the development of a high speed Internet transit to a Paris network node, the selling of dark fibre to other



telecoms companies, and the building of Wireless Local Loop connections to serve the least connected parts of the community.

## Business Case

### Investment:

30 Million Euros over 10 years.

### Number of years to ROI:

8 to 20 years depending on the area.

### Business model:

Open access.

### Customers:

All French national operators for dark fibre, and local operators for subscribers.

The principle all along has been to operate as a body that is part of the local economy, focused on local economic activity and whose profits are reinvested locally.

The plan established by the *Régie* and funded by the SEIPC is for:

- Fibre to the Building (FTTB), offering access speeds of 45 Mbps in areas of economic activity
- A minimum rate of 2 Mbps symmetric using wireless local loop (WLL) for regions most on the wrong side of the 'digital divide'
- Services for the various municipalities covered by the SEIPC



Citizens in the region have gained in many ways, says Alain Guillotin, Operations Director.

"For the same price they pay for ADSL, they can have the far more attractive option of fibre," he says. "Fibre connections are more reliable, with less interruptions to service. You get a clearer line for voice calls, and faster connections for data. You can also get a bundled TV offer,

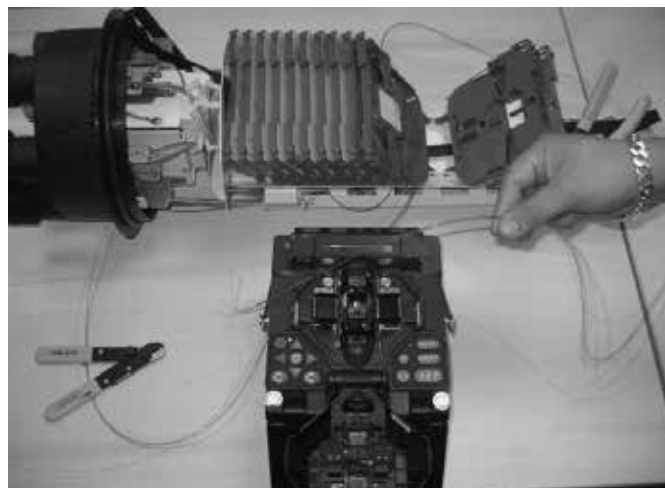
necessitating fewer satellite dishes on balconies."

He sees service offers evolving towards more interactive applications that need increasingly high bandwidth, such as video links for communications with family members around the world.

"We're seeing new services for residential customers such as video on demand, eLearning, home working, local TV channels, multi-dwelling property management services," he says. "More will appear, now there's no constraint being imposed on the volume of data."

As for the region's enterprises, they've benefited too, says Guillotin. So far, nearly 100 companies have been directly connected to the Internet with fibre, some small businesses, some with multiple premises.

"They're enjoying new services, such as telemedicine, remote surveillance, video surveillance, thanks to fibre, which is already changing the way people work," he says. "A company doesn't have to move locations, if it has an easy and cheap way to reach services. They can now settle in an agricultural area of Eure-et-Loir and be connected to the entire world. There's no need to be in the centre of Paris to have a fibre connection."



He says businesses are finding fibre refreshingly reliable, as well as faster and smoother: "Guaranteed restoration time of four to eight hours is much appreciated, particularly by service industry companies. And in a world that is changing faster by the day, businesses find that their ability to react increases once essential information runs over a reliable fibre network. Moreover, the more digital they are, the more paper they save, and the more they use videoconferencing, the more they save on travel."

## End-user Services

### Services:

Infrastructure services for operators, sold also as dark fibre, so they can develop services to residents and businesses. These operators are free to offer their customers services such as Internet, VoIP, VoD, IPTV.

IP services for the municipalities, to connect buildings.

Compared with the short-term solution of DSL, a business knows that with fibre it is investing in its future. This is reassuring for CEOs and those with control of finances, he says: "The companies we have spoken to say they are ready for tomorrow's services and applications, and are eager to adopt them."

Written in June 2011

With support from bmp Telecommunications Consulting

Photos provided by SEIPC

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### Targeted, original marketing activities are the key to success

*BORnet GmbH, in cooperation with passive network operators, plans to connect several thousand more households to fiber during 2012*



BORnet GmbH, headquartered in Borken, was founded in 1998 as a telecommunications company. The shareholders are EnKoBW (Stadtwerke Ahaus, Bocholt, Borken, Gescher, Gronau, Rhede and SVS Versorgungsbetrieb GmbH in Stadtlohn), as well as two private companies.

First, every house was supplied with a bag of fresh rolls in a cloak and dagger operation. This caused intense discussions amongst the citizens: everybody wanted to know where the surprise had come from. After that yellow roses were distributed to female visitors to the local farmer's market – here also the sender was unknown.

## General Information

### Infrastructure owner:

Passive network: infrastructure network operators

Active network components: BORnet GmbH

### Location:

City district Barlo of the city Bocholt

Planned in 2012: several thousand households in city districts of other cities in the region

**Network status:** Operational

A few days later, the sender and the background of both actions were announced during several locally based direct marketing campaigns and on-site events.

In addition to the on-site events, interested citizens could get more information about the development of the number of actual registrations on the "...n bit-ken flotteren" Website.

The first FTTH project of BORnet GmbH was launched in Barlo, a city district of Bocholt. For the so-called "demand aggregation", which took place over a limited period of seven weeks, an extraordinary marketing concept was developed so that every citizen in the area to be covered would be informed about the planned cooperation between Bocholter Glasfaser GmbH and BORnet GmbH. Due to the high level of investment needed to build a fibre-optic network, it was essential that at least 40% of the households passed should order a fibre product from BORnet.

## Deployment

### Size of network:

602 homes passed, more than 60% are connected (2012 more projects are planned to add several thousand households)

### Technology/architecture:

FTTH in an active Ethernet configuration

### Third party access

Open access

Following the numerous marketing activities, all interested citizens and the press were informed that the 40% mark had been achieved. After seven weeks of demand aggregation, 53% of all households passed had opted for a fibre connection. Currently, about 63% of the citizens in the area covered are consuming Internet, telephony and TV over fibre.

## Business Case

### **Investment:**

Several million euros together with the infrastructure network operators. Public funding was not claimed.

### **Business model:**

BORnet rents the passive infrastructure from various network operators, operates the active network and provides services (Internet, telephony and TV) to business and private customers.

In April 2011 a ground-breaking ceremony was celebrated together with the leaders of the project (BORnet and Bocholter Glasfaser), local political representatives (amongst them the administrative head of Borken, mayor and other members of the parliaments of the administrative district Borken and the city of Bocholt) as well as the press.

In the next step, citizens of several districts in different cities in the region will have the chance to get a connection of the future. In the selected communities demand aggregation activities will start in time intervals of one week. First, small yellow bags filled with four wine gum snails will be distributed. The bags carry the saying: "Schluss mit diesem Schnecken tempo – 'n bit-ken flotter bitte!" (Stop this snail's pace – a little bit faster please!) As in Barlo, the sender will be unknown at the beginning. Afterwards, the process of demand aggregation will be very similar to the that of the pilot project.

As well as FTTH projects for the retail sector, BORnet is also active in the area of business customers. Following the motto "From the region – for the region" the regional telecommunications provider focuses on building the local infrastructure. In the past years BORnet has connected several industrial zones to the fibre network. The companies residing there will benefit from super-fast Internet, which is becoming an increasingly important factor when deciding where to site a business.



"In the past we had the problem that the distances between communities could not always be bridged" explained Stephan Klaus, managing director of BORnet. A remedy has been achieved by the duct network which the district of Borken has implemented with funding from the Federal economy package II. According to the administrative head of Borken, Dr Kai Zwicker, this concept could provide the basis for the supply of broadband across the whole district.

## End-user Services

### **Business customers:**

BORnet operates an active Metro-LAN in the region. For business customers, tailored solutions are provided. The tariff depends on the services provided.

### **Private customers:**

Fibre products with symmetrical bandwidths between 50 and 200 Mbps starting at €45 (fee per month inc. VAT based on a 24-month contract).

Voice, TV and other modules are optional.

Written in January 2012  
Photos provided by BORnet GmbH  
Contact us on [info@ftthcouncil.eu](mailto:info@ftthcouncil.eu)

## M-net and SWM deploy one of the largest fibre optic networks in Germany

Stadtwerke München and provider M-net aim to connect half of the Munich households to fibre optic networks by 2013.

In October 2007, both M-net Telekommunikations GmbH and Stadtwerke München GmbH (SWM), together with Stadtwerke Augsburg Energie GmbH, Allgäuer Überlandwerk GmbH, N-ERGIE AG, infra fürth GmbH and Erlanger Stadtwerke AG, all shareholders of M-net – started the network deployment in Munich with a ground-breaking ceremony. With a fibre optic network as next generation access technology, about half of all Munich's households should progressively get high-speed Internet access with 100 Mbps. The pilot project planning was done together with the Cologne-based city carrier, NetCologne, with whom a close cooperation exists since many years.

### General Information

**Infrastructure/network owner:**  
SWM Services GmbH

**Location:**  
Municipal districts of Munich

**Network status:**  
Operational

During the development phase, 63 buildings with a total of 567 apartments in the Neuhausen district, owned by the real estate company GEWOFA, were connected. The pilot project was realised with active Ethernet technology; for the actual roll-out GPON is used.

The go-ahead for commercial roll-out was given in March 2009. During the first roll-out period, residential buildings in the districts Au and Neuhausen were connected, and the green light for the investment of several €100 million for an intensive deployment of a fibre optic network in Munich was given. Further development included buildings in Westend, resulting in some 3,000 connected buildings by the end of 2009. Besides answering the increasing demand for higher bandwidths, one of M-net's objectives with this deployment is to substitute the TAL-connections (subscriber access lines provided by Deutsche Telekom) with their own fibre connections. In future, this should reduce significantly the TAL rental fee for the last mile, which amounted to €10.50 per subscriber connection. In 2009, M-net paid approximately €28 million for renting these TAL-connections.

Getting fibre-based Internet access with speeds of 100 Mbps only requires the installation of a hardware box in the basement next to Deutsche Telekom's old distribution point. For the distance between the fibre termination in the basement and the apartments, M-net uses the existing copper infrastructure. The existing in-house cabling is thus further used, reducing costs and allowing for a quick installation of new multimedia connections.



In November 2011, SWM had finished about 50% of the civil engineering required to directly connect buildings to fibre, in view of strengthening the economic position of Munich, amongst other objectives. Next to the already covered districts, the historic old city around the world-famous Hofbräuhaus and Viktualienmarkt was also tackled. Fibre optic connections are available now in the following city districts: Neuhausen, Au, Schwanthalerhöhe, Ramersdorf-Nord, Obergiesing-Süd, Schlachthof, Schwabing-West, in the area of Arcisstraße, the area east of Landshuter Allee,

### Deployment

**Size of network:**

By 2013, 350,000 households will be passed, this represents approximately 50% of all Munich households.

**Technology/architecture:**

FTTH and FTTB in a GPON configuration.

**Third party access:**

Layer 2 bit stream access will be offered from 2012





Nymphenburg and Isarvorstadt. During the next planned deployment works large areas of Schwabing Mitte and Schwabing Süd, Lehel, Haidhausen, Ramersdorf Süd, Obergiesing Nord, Sendling Süd und Neuhausen will be connected to the future-proof high-speed network. Currently SWM has completed about 50% of the necessary civil engineering works required to directly connect buildings with fibre.

Deploying fibre infrastructure in the historic old city around Hofbräuhaus and Viktualienmarkt raised some specific considerations regarding tourism and gastronomy.

## Business Case

### Investment:

Approximately €250 million together with Stadtwerke München. State aid and public funding have not been claimed.

### Business model:

M-net rents the passive infrastructure from SWM Versorgungs GmbH, operates the active network and provides services (including TV-services) to business and private customers.

“With these fibre broadband connections we fulfil a basic requirement for infrastructure of the digital future” explains Jens Prautzsch, spokesperson of the M-net management. “This solution provides the user with access to modern multimedia applications and offers much higher quality and performance compared with other Internet access possibilities.”

Through this high-performance fibre architecture M-net can supply high-quality TV-services with a wide range of national and international TV channels to their customers. The standard selection offers almost 50 analog, approximately 100 digital and many HDTV channels.

Furthermore M-net offers a large number of international packages.



After realising successfully the extension of broadband in city areas inside the “Mittlerer Ring”, the step-by-step deployment of fibre is planned also in city districts outside of the “Mittlerer Ring”.

## End-user Services

### Business customers (monthly fee before VAT):

Fibre-SDSL with symmetrical bandwidth

- Glasfaser-SDSLflat 5000 (Fibre-SDSLflat): 5 Mbps, € 149,00 (Fibre-SDSLflat)
- Glasfaser-SDSLflat 10000 (Fibre-SDSLflat): 10 Mbps, € 349,00
- Glasfaser-SDSLflat 25000 (Fibre SDSLflat): 25 Mbps, € 549,00

### Private customers (monthly fee incl.VAT, based on 24 month contract):

Fibre-DSL with different speeds

- Telephone-Flat €24.90
- Internet-Flat €29.90 up to 25 Mbps
- Double-Flat €34.90 up to 25 Mbps
- High-speed upgrade €9.90 up to 50 Mbps and €19.90 up to 100 Mbps

Written in January 2012  
Photos provided by M-net  
Contact us on [info@ftthcouncil.eu](mailto:info@ftthcouncil.eu)

## From Cologne city carrier to successful regional operator

*With an attractive broadband offer based on FTTB and HFC networks, NetCologne is the leading full-service telecoms provider in Cologne and the surrounding area*



"We are building one of the most modern and fastest data networks in Europe here in the region", said Dr Hans Konle, spokesperson for NetCologne management. "We have gained extensive competence and experience as a regional network operator. I can absolutely imagine providing this know-how to other communities in the form of partnerships outside our present sales area."

### General Information

**Infrastructure/ network owner:**  
NetCologne GmbH

**Location:**  
Economic area Cologne/Bonn (in addition NetAachen GmbH, in which NetCologne holds a stake of 84.9%, supplies broadband to the cities and regions around Aachen, Düren, and Heinsberg).

**Network status:** Operational

In October 1994 NetCologne Gesellschaft für Telekommunikation mbH was founded by Gas-, Elektrizitäts- und Wasserwerke Köln AG (today: GEW Köln AG), Stadtparkasse Köln, and the transport authority of Cologne. From the beginning NetCologne has laid the foundation for its business success with investments in a state-of-the-art infrastructure. Ground was broken as early as 1995: NetCologne and GEW started to build the network. In the first stage, 3 500 buildings were connected with the latest fibre technology by the end of 1995. With data rates of 155 Mbps and later also with 622 Mbps, telephony and multimedia signals were transmitted over the then high-speed ATM network.

When on January 1st 1998 the telecommunications market for telephony was liberalised, NetCologne was immediately able to offer network and service infrastructures as well as worldwide telephony services. With the early acquisition of licences to operate a public telecommunications network

### Deployment

**Size of network:**

3865 km fibre cable plus 12715 km fibre for FTTB

**Subscribers connected (August 2011):**

FTTB network: 60,633 households

**Technology/architecture:**

Fibre-optic network in a ring structure with direct connections to customers via FTTB using active Ethernet – also via the HFC network in parallel

**Third party access:**

Layer 2 bitstream access

and provide worldwide telephony services, NetCologne is one of the pioneers in this area. Apart from Deutsche Telekom, for many years NetCologne was the only telecommunications operator with its own network.

The company grew rapidly during the following years and increased the number of customers accordingly. By 2002 NetCologne had connected more than 75 000 broadband contractual subscribers to its HFC network. Such a connection provides more than 50 analog and 70 digital TV programs as well as approximately 30 radio stations. But the so-called "Multikabel" can offer even more: to make low-cost telephone calls via one or two lines and to surf the Internet up to 2 Mbps. Thus NetCologne was the first supplier in Germany to offer these three services – known as triple play – as a regular service over a cable TV connection.



In July 2006 NetCologne celebrated the start of building the FTTB network, one of the fastest data networks in Europe. NetCologne is building this new network directly into the buildings of their customers and is thus independent of Deutsche Telekom, from whom the last mile must be rented in the conventional DSL business. With bandwidths up to 100 Mbps, the new network offers at attractive tariffs, not only telephony and Internet but also IPTV, HDTV, and video-on-demand. By offering extremely reasonable tariffs and remarkable technical innovation, NetCologne has become one of the most successful regional carriers in Germany – for the benefit of private and business customers as well as the housebuilding economy in the area of Cologne/Bonn.

## Business Case

### Investment:

NetCologne invested a total of approx. €350 million into passive networks between 1995 and 2011.

### Business model:

As a regional network operator, NetCologne supplies the economic area of Cologne/Bonn with future-proof communications technology. As full-service provider NetCologne operates the network based on their own infrastructure and offers services for telephony, data, and TV for business and private customers.

The technical basis for the company's success is having its own comprehensive fibre network. It is one of the most modern networks in Europe and offers capacities for continued dynamic development of the communications in the region. In 2005 the city of Cologne and NetCologne started a joint project to create 15 HotSpots in selected places in the centre of the city. Visitors also have free access to certain websites such as city information.



In January 2012 NetCologne and Deutsche Telekom signed a partnership agreement. This agreement should allow Telekom to use fibre connections (FTTB) from NetCologne. In turn, NetCologne will rent VDSL connections from Telekom in the commonly served area in North Rhine-Westphalia. The basis for end-user offerings will be a bitstream access product. "We are proud to be the first company in Germany to have signed such an agreement with Telekom," said Konle.



The oversized "Network Node" (above) – the sculpture of the artist Wolfgang Göddert – is a symbol for the telephone network. As well as modern technology and reasonable tariffs, customer service always has been a priority. The company's sign illustrates this philosophy: NetCologne is laying the foundations for good relationships in the ground, and the services offered provide new and convenient ways to communicate.

## End-user Services

### Business customers:

NetCologne offers comprehensive advice and customized services for small, medium, and large organisations. Fiber-optic connections are offered with symmetrical bandwidths up to 1 Gbps.

### Private customers:

Internet connections either via fibre or coaxial cable are offered under the product name "Multikabel" with data rates up to 10 Mbps.

### Product examples:

Telephony-Flat €19.90  
Internet-Flat €19.90 up to 25 Mbps  
Double-Flat €29.90 up to 50 Mbps  
and €44.90 up to 100 Mbps  
Various TV offerings from €2.95 to €14.95

Written in January 2012  
Photos provided by NetCologne  
Contact us on [info@ftthcouncil.eu](mailto:info@ftthcouncil.eu)





## Bavarian municipality builds its own FTTH network

*Within the framework of an exemplary public-private partnership project, all households in the municipality will be connected directly to fibre networks.*

The poorly connected municipality of Oberhausen was not satisfied with the offer from Deutsche Telekom for upgrading the existing infrastructure, because the incumbent operator had asked for excess construction costs of more than half a million euro, while only offering data rates up to 6 Mbps. When cable TV operator Kabel Deutschland announced that it too was not willing to upgrade its existing infrastructure for high-speed Internet access, a feasibility study was ordered. The results were presented in March 2009.

### General Information

**Project name:**

Unser Ortsnetz-Oberhausen (Our local Network)

**Infrastructure owner:**

SBO GmbH, a company 100% owned by the municipality of Oberhausen

**Location:**

Municipality of Oberhausen and the community of Bergen near Neuburg an der Donau

**Network status:** Operational

The conclusion of this study was, in short: "Every action that has a FTTH network as intended outcome, is a correct action ...". In June 2009, the town council decided to make a European-wide call for tender for the deployment of a multimedia broadband network with data rates of at least 50 Mbps for all households. The tender specification required non-discriminatory and technology neutral access to the network for third parties, as well as a detailed financial model. After receiving an offer that matched all their requirements, the town council decided in December 2009 to go ahead with the deployment. In February 2010, a contract to build the complete network was signed with the supplier.



A precondition for starting the deployment was a minimum take rate of 75% for these 1150 households. This goal was achieved in a short length of time by assigning "knowledge multipliers" to the task. About 70 women and men from the village committed themselves to support the municipality to realise the project – in the picture the team of village district Unterhausen. They:

- sacrificed their free time (in total around 2000 hours of voluntary work)
- spread information in the community;
- delivered the necessary work to convince subscribers;
- collected over 800 contracts from local citizens, and
- supported them when completing the contracts.

On 3 June 2011 the first subscriber connection became operational. By the end of 2011 the roll-out of the entire infrastructure should be completed. In December 2011 already 1 050 households out of the 1 150 households in Oberhausen were connected to the future-proof multimedia network and are now enjoying the available services in the highest quality.

### Business Case

**Investment:**

About €4 million was financed by Raiffeisenbank Ehekirchen-Oberhausen, a co-operative bank. State aid and public funding have not been claimed.

**Business model:**

Public-private partnership - [www.oberhausen-donau.de/Gewerbe/Glasfaser-in-Oberhausen](http://www.oberhausen-donau.de/Gewerbe/Glasfaser-in-Oberhausen)

### Deployment

**Size of network:**

Out of a total of 1150 homes passed 1050 are connected in Oberhausen, in addition 150 households are connected in Bergen.

**Technology/architecture:**

FTTH in an active Ethernet configuration



As well as the municipality of Oberhausen, 150 households in the district of Bergen near Neuburg an der Donau are connected to the fibre network, because Bergen is immediately located on the route of the backbone connection between Oberhausen and Neuburg.

“The community project ‘Deployment of a multimedia broadband network’ was and is marked by technological vision, an unbelievable solidarity between the village districts and a real sense of community in the municipality of Oberhausen,” commented Fridolin Gößl, Mayor of the municipality of Oberhausen. “I hope and wish that ‘Unser Ortsnetz-Oberhausen’ will run smoothly for decades and consequently contribute to a better quality of life.”



## End-user Services

### Business customers:

Tailor-made offers with data rates up to 10 Gbps

### Private customers:

(monthly fee inc. VAT based on 24-month contract)

#### Single package:

Telephone Standard analogue €15.90

Telephone Premium (flat rate into German fixed network) €25.90

TV €16.90

Internet €25.90

#### Double package:

Telephone Premium & TV €39.90

Telephone Premium & Internet €49.90

Internet & TV €41.90

#### Premium package:

Telephone Premium & Internet & TV €59.90



With the infrastructure for the broadband multimedia network completed, the municipality of Oberhausen is prepared to meet future demands. With the local data centre as a starting point, ducts have been deployed across the entire area, allowing for on-demand upgrades in the future. For each connected household, two fibres have been allocated. In the main fibre routes, spare capacity of 10% has been allowed for future expansion.

As background information, Gößl lists the following data points: “For the construction of the network, we needed to ask for 12 rights of way to cross streets, the river Danube and private properties. So far:

- about 55 km of civil works were carried out;
- 62.5 km fibre-optic cable were deployed;
- a 11.5 km backbone was installed towards Neuburg an der Donau, which also connects to the district of Bergen;
- more than 100 km of ducts were deployed and 70 access and distribution cabinets installed; and
- a locally owned data centre (POP) was built, which houses all the active and passive components.”

A special challenge when deploying the backbone fibre cable was posed by the crossing of the river Danube, but this was easily mastered with the help of THW (Bundesanstalt Technisches Hilfswerk – Federal Agency for Technical Relief).

Written in December 2011

Photos provided by the municipality of Oberhausen

Contact us on [info@ftthcouncil.eu](mailto:info@ftthcouncil.eu)

# Sasbachwalden

## FTTH CASE STUDY

### Installation of fibre-optic cable on land, in water and in air

*This sprawling rural community in the Black Forest was selected as a model broadband project and now owns the first FTTB network funded by the state of Baden-Württemberg.*

The citizens of Sasbachwalden have been generally unhappy with the lack of broadband in their community. The problem was particularly acute for a conference hotel in the community. Upon request, Deutsche Telekom informed the community of Sasbachwalden that an extension with DSL would require a guarantee in the amount of €500 000 for a minimum of 800 new subscribers. This offer was refused. Afterwards the community started negotiations with suppliers of wireless solutions, which were not feasible because of the difficult topography a complete solution could only be realised with enormous effort and expenditure. In addition, the new installation would require fibre to be installed over a minimum distance of 3km.

## General Information

### Location:

Community of Sasbachwalden (2500 inhabitants and 177 companies spread over 13 km<sup>2</sup>)

### Network/infrastructure owner:

Community of Sasbachwalden

### Network status:

Operational

Why not deploy the same fibre into every single home? After consulting with the clearing office "Neue Medien im Ländlichen Raum" (new media in rural areas), which gives advice to communities in Baden-Württemberg about broadband deployment, it was decided that a feasibility study should be carried out to clarify the technical and financial foundations for creating an open and neutral fibre infrastructure for Sasbachwalden and connecting it to existing fibre networks.

## Business Case

### Investment:

~€3.6 million. Public funding was granted in the amount of €1.5 million. The financial resources came from the program "Developing the rural area" (ELR) of the state of Baden-Württemberg and the economy package II of the German government

### Business model:

telsakom rents the passive infrastructure exclusively from the community Sasbachwalden, operates the active network and provides services (in future also TV services) to business and private customers.



Following a public tender, an engineering firm was assigned to carry out the study. Half of the costs for this feasibility study in the amount of €58 000 were eligible for public funding due to the model character of the project. The target of the pilot project was to gather new insights about the development of broadband infrastructure in rural areas. Within the framework of this study, a survey of private and business customers was carried out. Private users indicated that they would be willing to pay up to €60 per month for services. All businesses were willing to pay a one-time installation fee. Furthermore, 80 % of the companies could also make a financial contribution to the project.

## Deployment

### Size of network:

44 km of network with 165 km of optical fibre. The fibre is available for everybody – 1 280 households in 578 buildings distributed over 44 streets. On January 18th 2012, 191 subscribers were connected by telsakom

### Technology/architecture:

FTTH in a GPON configuration

### Third party access:

Service layer (layer 3)

The result of the study, which was presented in October 2008, confirmed that the extension of the street cabinets with DSL could not meet all requirements of the community. However, the concept of "Fibre to the building" (FTTB) did match the requirements of the community Sasbachwalden, both now and in the future:



- The main target for equal treatment of all connected subscribers (private and business) is met without problems.
- Two more requirements, such as a local LAN-LAN connection and the distribution of TV signals, can also be achieved.
- FTTB represents a sustainable solution to the problem to supply broadband
- Fast Internet access is seen as an important locational factor for businesses and tourism.

## End-user Services

### Business customers:

under preparation (fees per month before VAT):

business €149,00

Internet flat rate with 50 Mbps download and 25 Mbps upload, attractive phone tariffs for commercial users, if required ISDN interfaces

business plus €199,00

Internet flat rate with 70 Mbps download and 35 Mbps upload, telephony same as saschwalle business

**Private customers** (fees per month incl.VAT, based on 24-month contract, one time activation € 99.90):

saschwalle comfort € 49,90

Telephone Flatrate for two numbers and Internet with 50 Mbps download und 2 Mbps upload

saschwalle comfort plus € 64,90

Telefon Flatrate for two numbers and Internet with 75 Mbps download und 3 Mbps upload

saschwalle ferien € 49,90

only for owners of a second home, can be activated monthly, per activation additionally € 14,90

TV services under preparation, testing in progress.

In October 2009 the construction phase was started. The responsible operating company for the infrastructure was founded in January 2010 by the community. The fibre cables for the network of approx. 44 km in length have been laid in conventional trenches, sewers and using overhead lines. As well as the conventional construction methods for deploying fibre-optic cables, alternative methods have been used: mole ploughing, vibration ploughing, aerial poles and microtrenching. The innovative network concept "earth-water-air" has been realised as follows: 22 km with conventional civil engineering, 4 km in sewers, 6 km over aerial cables, 8 km by deploying new ducts or using existing ones, and 3.5 km by private construction.

Valentin Doll, Mayor of Sasbachwalden said: "This fibre project is an important step to prepare our community and holiday region for the future. A long-held dream is now fulfilled. We recently lost a number of businesses due to our poor Internet access. Those companies often move into the neighbouring region of Alsace on the other side of the river Rhine where fast Internet has been available for some time now. Broadband has also become an important locational factor for the tourism industry: it is not possible to market yourself as a provider of seminars or conventions without good access to the Internet."



Written in December 2011

Photos by community Sasbachwalden and seim & partner

Contact us on [info@ftthcouncil.eu](mailto:info@ftthcouncil.eu)



# Bóly City

## Bóly kicks off regional fibre boost

Local council takes the lead

Bóly, with its population of 3,888, is located in Hungary's Southern Baranya County, between the cities of Pécs and Mohács. It is the centre of a 'micro region' that includes 14 towns, with a total population of 12,000. Throughout its history, the town has played a vital role in regional economic, cultural and educational development.



"In the 1990's, the people of Bóly were very receptive towards new TV, Internet and phone services," explains Mayor Josef Hárs. "With their help, we rolled out one of Hungary's first complete cross-town infrastructures. Bóly citizens were the first Hungarians with Internet access through a cable TV network and around 2005, almost half the citizens had Internet access. Demand kept growing, so the outdated, slower network was replaced with state-of-the-art FTTH technology. With more and more essential information and services available over the internet, fast and reliable access is quintessential in all walks of life, for businesses and homes alike."



### LOCAL GOVERNMENT AS ISP

Acting as a service provider, Bóly's local government takes care of billing and customer service. Maintenance tasks are carried out by a

local firm. Presently, local government provides three types of affordable, high-quality service: the first is an IPTV solution. Clients can choose from five subscription packages, which include 55 TV channels in Hungarian, German and English, some of which are available in HD. The second service is Internet access. The third is analogue and ISDN land lines. One important point in the Business Case was to price the significantly faster new services at the level of those already available in the region.

## Network

1458 institutions and companies connected - 99,5% of all premises!

1286 subscribers - 87,8% of all homes. )

1122 IPTV subscriptions and 622 internet subscription

Investment: 1 Million EURO paid entirely by Bóly city council. 20% own funds, 80% bank loan (5 years payback) and no subsidies. Citizens who financed the cable TV and substructure investment in 1989, were not required to make a financial contribution. In the original business case, return on investment was placed at seven years.

Connection equipment facilitates the use of two analogue phone lines, 7 television sets and Internet connection per unit.

Deployment: 9 months during 2006/2007

"In the early 90's, a substructure network was laid down in most parts of Bóly, with the citizens' help" adds Mayor Hárs. "This already housed the fibre-optics trunk line, which means streets didn't have to be excavated later. The contractor designed





an FTTH network that adapted to the existing network, in order to provide fast and cost-efficient implementation.”

## End-user Services

### Home package:

- Download: 10Mbps / Upload: 10Mbps
- FTP storage 100MB / Web storage: 50MB
- 5 e-mail account / Dynamic IP address
- Monthly fee: HUF 5 000 (approx 19 euros)

### Business package:

- Download: 20Mbps / Upload: 20Mbps
- FTP storage 200MB / Web storage: 100MB
- 10 e-mail accounts / Static IP address
- Monthly fee: HUF 10 000 (approx 37 euros)

### Senior citizen package:

- Download: 2Mbps / Upload: 2Mbps
- FTP storage 50MB / Web storage: 50MB
- 2 e-mail accounts / Dynamic IP address
- HUF 3 000 (approx 11 euros)



“The high-tech infrastructure keeps young people in the city and attracts new high tech companies. It also connects the elderly, who we offer dedicated training, to today’s society. Recently, several companies switched to the ASP services made available by the development for their ERPs and bookkeeping processes. A CCTV system linked to the FTTH network was set up in the city’s Industrial Park and the system also meets the demand for remote monitoring and control of technological workflows.”

## RESEARCHING DEMANDS

Early on, the local government gathered information on subscriber demands. Based on this, network end points were implemented. Optical Network Terminator and Set-Top-Boxes were provided and the network was installed free of charge for all those wishing to subscribe to any of the provided services. The network was installed on 99% of the properties in Bóly. Since 2007, the price of building plots sold by the local government included the cost of network installation.



“Bóly’s youngest generation now has access to various applications that allow them, for example, to organise college schedules and exam periods from home,” says Mayor Hárs.

## MOVING TO 1 GIGABIT

“We are swiftly developing e-local government and e-administration solutions, including up-to-date news and information, contact options, downloadable forms and support for local administrative processes. The network is also used for referendums and city management has implemented an Executive Information System as part of the ASP service.”

“We still have many plans. We want to connect remote control of the geothermal utilities that provide heating to public institutions to the Fibre Network for faster, safer and more reliable operation. Also, we plan to upgrade the head end soon, and start replacing the 100 megabit end-user devices with 1 gigabit devices.”

Written in December 2011  
Photos provided by Boly City  
Contact us on [info@ftthcouncil.eu](mailto:info@ftthcouncil.eu)

# Fastweb

## Pioneering triple-play services over fibre in Italy

Fibre to the Home has been part of Fastweb's strategy from day one. The operator is now leading plans to upgrade the access network across the whole of Italy.

Back in 1999, internet access was less widespread in Italy than in other parts of Europe, possibly because local phone calls for dial-up access were chargeable. But a small group of entrepreneurs had a bold plan to leapfrog existing technologies by offering a package of high-speed internet and television services to consumers and businesses over a fibre-optic network.



"Fastweb started with the idea to completely replace the incumbent relationship with the customer, so we started thinking about a connectivity that was independent from the incumbent network," explained Enrico Pietralunga, service and design planning manager at Fastweb.



The plan was to create an end-to-end fibre network that would use the Internet Protocol (IP) to transport all services – voice, internet access, television and video on demand. This single, integrated network would allow the company to operate the network

at lower cost than the incumbents, who were constrained by legacy technologies and business processes.

The entrepreneurs went into partnership with the local electricity company in Milan, called AEM. Both parties invested in Metroweb, which was the communications arm of AEM, and e.Biscom, which became the parent company of service provider Fastweb. In early 2000, Fastweb started offering service to homes and businesses in Milan over the fibre network of Metroweb.

A public offering in March 2000 raised €1.67 billion, which funded the expansion in Milan and the north of Italy. Over the next few years, Fastweb passed 750,000 homes and connected approximately 145,000 subscribers to its fibre

network; roughly 50% were residential customers and 50% were business customers.

## Deployment

### Size of network:

Fastweb's fibre network passes 2 million homes and small businesses in seven Italian cities: Milan, Rome, Genoa, Turin, Bologna, Naples, and Bari.

### Technology/architecture:

The original network in Milan used Active Ethernet rings with equipment typically located in the basement of apartment buildings. More recent deployments, like the pilot network in Colina Fleming in Rome, use a point-to-point fibre topology.

### Deployment method:

Classical digging, reusing ducts where possible.

Fastweb was also in the unusual position in Europe of having no competition from cable or satellite television providers. The operator brought out competitively priced packages for triple-play, and quickly expanded the range of content available to subscribers.

Fastweb's internet services were also proving attractive to subscribers. "You have to think that in Italy when we started, big universities or executive customers usually had 2Mbps E1 connectivity. We brought 10Mbps to residential customers also, so it was quite disruptive," said Pietralunga.



When local loop unbundling became possible in 2003, the strategy changed. Fastweb continued to deploy fibre, but started adding new customers over ADSL connections, which allowed its customer base to grow much faster than it could have done otherwise.

Outside Milan, Fastweb expanded into other cities by leasing dark fibre where possible, for instance, on SasterNet in Genoa. It also entered a long-term agreement to rent space in the ducts of the Socrates network – a cable TV network owned by Telecom Italia.

## Business Case

### Investment:

Not available.

### Number of years to ROI:

Fastweb was able to raise money by holding a public offering in March 2000, when the stock market was buoyant.

### Business model:

Fastweb is a vertically integrated service provider, apart from Milan, where the network is leased from Metroweb.

As Fastweb started to grow outside Milan, AEM decided to sell its stake in the service provider. As a result, in 2003 e.Biscom exchanged shares with AEM, gaining full control of FastWeb and divesting from Metroweb.

In 2004 e.Biscom merged with FastWeb, changing the name of the group to FastWeb, which has become a widely recognised brand as the leading alternative service provider in Italy. Over the next few years, the company consolidated its position in the market. In May 2007 Swisscom paid €3 billion to acquire 82.4% of Fastweb, which became a full subsidiary in 2010.



In 2010, Fastweb decided to upgrade its network, taking advantage of the high-speeds possible over optical fibre by launching 100Mbps services to residential customers – this is a first for Italy.

Fastweb is also a key player in the “Italia Digitale” project (“Digital Italy”). Fastweb believes that the provision of a fibre access network is of strategic importance to Italy, but that the massive investment and impact of installation in urban areas does not permit the installation of competing networks.



An important step in the development of a next-generation fibre network for Italy took place on 28 October 2010 when all main Italian fixed operators, including Telecom Italia, signed a memorandum of understanding that define fundamentals aspects for the project “Italia Digitale”.

Operators and Government have agreed that there will be one single passive network infrastructure enabling both point-to-point and point-to-multipoint architectures that bring FTTH to 50% of the Italian population within 10 years.

The partners are testing out the viability of the project by building a pilot network in the Collina Fleming area of Rome. The first connections in the pilot network, which will reach 7,000 residential and small business customers, were made in July 2010.

## End-user Services

### Services:

Fastweb offers a variety of product bundles including voice, internet access and TV. In September 2010, it launched FIBRA100, which is a bundle add-on that allows FTTH customers to upgrade their internet connection to 100Mbps/10Mbps.

See also: <http://www.fastweb.it/offerte/fibra-100/>



## Record breaking roll-out speeds in Latvia

Incumbent Lattelecom transformed the country's broadband Internet market.

The global economic crisis of 2008 spelled the end for many European broadband infrastructure projects as investor confidence waned and cash dried up.

In Latvia, the Baltic state to the Northwest of the continent, tough times were the spur for a move in the opposite direction. Early in 2009, with the country's economy in difficulties, Latvian incumbent network operator Lattelecom announced a huge project - its Network of the Future - aimed at bringing about the next generation of broadband internet access services for the benefit of the country's citizens and businesses.

### General Information

**Infrastructure owner:**

Lattelecom, Latvia's incumbent telco.

**Location:**

Various mainly urban locations around Latvia.

**Network status:**

Operational.

With other telcos across the continent looking to save money and trim investment, Lattelecom pushed forward with the development of a huge FTTH network project for maximum long-term value, based on a GPON model.



"The economic crisis in Latvia was followed by a reduction in network development costs, whereby much of the work that was carried out cost less than it would have done in the years of Latvia's economic advancement," points out Juris Gulbis, Chief Executive Officer of Lattelecom

"In addition to this, our network expansion work was greatly strengthened by

workplace innovation. The company used outsourcing extensively, engaging various subcontractors, which allowed it to build its fibre optic network within a very short time, breaking records with 420 installed apartment buildings a month."

The result, remarked on many times since by admiring outside observers and independent experts, was over 400,000 installed apartments within the space of two years: "An unbelievable quantity, and an achievement we can look on as a real success story," adds Gulbis.



Such a major strategic project had necessitated numerous changes in Lattelecom's company's structure: "A special structural unit was set up to advance the project and be responsible for its progress," explains Gulbis. "As with any other major strategic project, this was monitored closely by the company's management board, allowing us to make timely decisions and ensure a high quality exchange of information."

### Deployment

**Network availability and penetration:**

By June 2011, a total of 357,485 homes were connected to the network (40.2% of the 888,400 households in Latvia). The network had passed 528,261 homes by that date, making the connection rate 67.7% of all passed homes.

**Technology/architecture:**

FTTH in a GPON configuration.

In order to develop its GPON network so fast and in such depth, Lattelecom also innovated with a two supplier strategy.

"Both suppliers offered us the best price for their terminal equipment and network nodes, which benefited Lattelecom and eventually also benefits the end user to whom the service is made more available," says Gulbis.



The result of Lattelecom's ambitious and innovative approach was groundbreaking. The FTTH infrastructure, when launched, allowed for initial transmission speeds of up to 100 Mbps, making it possible to watch streaming television channels at a high level of quality. Stunningly fast though this was for the time, it was not the full extent of Lattelecom's plans. Built into the network's design was the idea of increasing speeds to 500 Mbps, and eventually to 10 Gbps in the future.

## Business Case

### Investment:

The investment from 2008 to the end of 2011 will total 40.7 million Latvian Lats (approximately 57.5 million Euro). Lattelecom is the only investor, with zero public subsidy.

### Number of years to ROI:

Business case calculated over a 10-year period.

### Business model:

Lattelecom is a fully integrated operator that builds and operates the network, and provides services.

The idea of a network running at 100 Mbps is no longer new, but it certainly was when Lattelecom launched its FTTH network with the aim of revolutionising the habits of customers in Latvia.

"We introduced a new industry standard with our 100 Mbps speeds," comments Gulbis. "This was later introduced by other companies. Lattelecom was also the first operator to launch a 500 Mbps service designed for use by residential customers. The network has also enabled us to build a value-added brand and strengthen the company's image, positioning Lattelecom as a modern and innovative operation."



Lattelecom's reputation for an Internet service that was steady but only moderately fast was transformed: "Now we have expanded our fibre optic network to such level that the message is clear - our Internet is both fast and steady. We're not just boasting when we say that today in Latvia we have one of the most modern FTTH networks in Europe, enabling the people of the country to use one of the world's highest speed Internet services."

## End-user Services

Based on GPON, services for end-customers as follows:

### Residential services:

Internet up to 20 Mbps from 9.98 to 11.98 Lats (approx 14 to 17 Euro)

Internet up to 100 Mbps from 14.98 to 16.98 Lats, (from 21 to 24 Euro)

Internet up to 200 Mbps from 19.98 to 21.98 Lats, (from 28 to 31 Euro)

Also available: Internet + ITV packages from 15.98 to 25.99 Lats (22 to 37 Euro) depending on speed

### Business services:

Metro 10 (up to 10 Mbps, static IP) for 24.28 Lats (approx. 34 Euro)

Metro 20 for 45.49 Lats (64.5 Euro)

Metro 50 for 71.98 Lats (102 Euro)

The resulting network is the basis for a range of bundled services incorporating high speed internet access, phone calls and Lattelecom TV, and also enables new types of service that demand higher bandwidth, like HDTV.

Written in July 2011  
Photos provided by Lattelecom  
Contact us on [info@ftthcouncil.eu](mailto:info@ftthcouncil.eu)

## National incumbent in Lithuania leads fibre developments

Lithuania enjoys the highest penetration of fibre access in Europe, thanks in a large measure to the bold initiatives of national telco TEO.

The latest FTTH Council Europe Ranking of countries leading the way in deployment of fibre access shows that Lithuania retains the top European spot, ahead of other pace setters like Sweden, Norway, Slovenia and Slovakia.

### General Information

**Infrastructure owner:**

TEO has 40% of Lithuania's Internet market, and 30% of its pay TV market.

**Location:**

Nationwide, across Lithuania, although mainly in urban locations.

**Network status:**

Operational.

One of the leading forces in high speed broadband deployment in the Baltic country is incumbent telco TEO. Lithuania's broadband market is dynamic and competitive, says Darius Didzgalvis, the company's Chief Technology Officer and Deputy General Manager.



"There's a very high level of competition in Lithuania in the market for Internet services, with over 100 ISPs serving 1.2 million households and 3.5 million people," he says. "Historically competitors have used our infrastructure, but many also have their own infrastructure too."

In 2006, TEO decided to move its broadband investment up a gear, embarking on the building of fibre connections directly into as many households as possible. The intention was to reach a large proportion of the population with FTTH services.

"We chose to deploy FTTH, while other network operators were still depending on copper or FTTB," claims Didzgalvis. "We are now moving from FTTH point to point to GPON. I think we chose right here – with point to point to start with and GPON now that prices are falling."

### Deployment

**Size of network:**

714,000 households passed (59% of Lithuanian households).

**Technology/architecture:**

Point to point, moving to GPON.

**Deployment method:**

Deployment of FTTH started in multi-residential buildings and business centres. Now the network is being spread to single houses where business cases are composed.

Before long, TEO's efforts had played their part in a national phenomenon. Within two years of TEO's fibre access deployment, Lithuania enjoyed the highest penetration of fibre in Europe, with 23% of households connected.

"We're still the second highest country in the world for speed of network, upload and download, after South Korea," says Didzgalvis proudly. "And 59% of households are now passed in Lithuania. We have 147,000 active users, following a couple of extremely fast years of growth. There's still room for growth, particularly in single houses, which will take a broad consensus between municipalities, content companies, building managers and others." TEO is now present with FTTH in approximately 120 cities and towns, currently concentrating on the individual houses around the largest cities and spreading the network in some of the smaller ones.

He says that despite its obvious success, TEO faces challenges as it seeks to push its FTTH initiative into new areas: "The technology is simple enough," he maintains. "It now takes just two hours or less to install a new customer, right through to service activation. But it's not just about the fibre. It's about the equipment you install in the customer premises to make 100Mbps happen, or even 1Gbps. How can this be future-proofed? There's the matter of the backbone network too. Are there wide enough pipes? Is it economically efficient?"

## Business Case

### Investment:

LTL 329 million (EUR 95.3 million) invested between into the development of just the FTTx access network between 2007 and 2011.

Total investments into upgrading of core and extension of access network over last 5 years amounted to LTL 659 million (EUR 190.9 million).

**Business model:** Price per home passed of 130 Euro.

He says that in any case, the biggest FTTH challenge these days is the business case for extending deployment, not simply the technical hurdles. Happily for TEO, the business model behind its deployment helps to create a favourable climate for consumer adoption.

"We're at 714,000 homes passed, at a price per home passed of 130 Euro," he says. "That's relatively low, and helps to make the business case. Our competitors are finding it hard to make the same business case, because of the financial slowdown. We invested at the right time."



The impressive success of fibre access in Lithuania has been enabled by other factors too, says Didzgalvis. "Fibre network operators here are able to pose a big challenge to mobile operators. There is a generally lower quality of mobile service in Lithuania comparing to FTTH, and we are able to run away from that element of potential competition."

## End-user Services

### Services:

Three basic Internet connection speeds are offered to customers:

up to 50 Mbps for 11.6 Euro

up to 100 Mbps for 14.5 Euro

up to 300 Mbps for 23.1 Euro

But it is the sheer quality of service enabled by fibre that has really propelled its popularity: "If you are getting 100Mbps or close at home, that's office speed, and means you can use cloud services to work from home, or anywhere," explains Didzgalvis. "Consumption of data has increased heavily here, with lots of high quality multimedia running over the networks. Fibre is a good enabler for enterprises too, allowing them to attract new business. We are going to be investing in business centres, so that soon 80% will get fibre. Copper is seen as old fashioned now."

He is not happy to rest on past successes though: "It's not the end of the game, with the business case needing to be made to connect to more single houses," he says. "We must develop more services for customers too. Every 18 months, we are going to see traffic doubling. We need more services in all the areas we serve - Internet, TV, VoIP and IT."

Written in March 2011, updated in August 2012  
Photos provided by TEO  
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# POST Luxembourg

## POST Luxembourg Invests in National FTTH Coverage

Luxembourg sees 100% FTTH coverage as key to future economic growth

Luxembourg has one of Europe's smallest populations, but it also has one of the region's most far-reaching and advanced fibre to the home (FTTH) deployment programmes.

Indeed the company has met the government's 2015 targets of being capable of providing 1 Gbps downstream and 500 Mbps upstream to 50% of homes in the country.

### General Information

**Location:**

Luxembourg -- national network

**Infrastructure owner:**

POST Luxembourg

**Population:**

Roughly 563,000

In April 2010 the Luxembourg government set targets to provide, by 2015, broadband speeds of 1 Gigabit-per-second (Gbps) downstream and 500 Megabits-per-second (Mbps) upstream to 50% of the population, and 100 Mbps downstream and 50 Mbps upstream to remaining households. By 2020 Luxembourg wants all of its citizens—which currently number some 563,000—to have a minimum of 1 Gbps downstream access.

State-owned incumbent, POST Luxembourg, is already on track to fulfil the government's plans with its countrywide build-out of a point-to-point FTTH network.

"The government wants to see more ICT players here. We want to attract international firms and be a global hub for all ICT related activities. We already have five interconnected data centres with a total computing space of nearly 17,000m<sup>2</sup>, 90% of which is Tier IV," says Gaston Bohnenberger, Director of POST Technologies, the wholesale unit of POST Luxembourg. "We know fibre is what we need for the future."



POST Luxembourg first laid FTTH in 1997, as part of a hybrid copper and optical fibre access network. However, it wasn't until 2007, when FTTH customer premises equipment prices fell to a level that made services economically viable, that the operator started installing passive optical splitters in its street cabinets. By the end of 2010 it had connected approximately 18% of Luxembourg households to its point-to-multipoint GPON network.

### Deployment

**Size of network:**

- More than 50% homes passed
- Planning: more than 60% homes passed by 2017

**Number of subscribers:**

More than 25% take up

**Technology/architecture:**

POST Luxembourg provides point-to-point network access.

**Deployment methods:**

POST Luxembourg coordinates closely on engineering works with utility companies and municipalities to reduce cost and disruption of network deployment wherever possible. The operator strives to re-use existing ducts into which it extends micro-tubes. This way it avoids digging trenches and merely needs to create a small opening by the customer's existing duct through which to draw the micro tube.



In 2010, in order to prepare for higher broadband network capacity, POST Luxembourg decided to move to a point-to-point architecture and give every customer four fibres, two of which are connected to an optical distribution frame. If a customer needs more than two fibres, the remaining two fibres can be activated in the joining box, explains Bohnenberger.

While POST Luxembourg is moving quickly on FTTH deployment, it views the network as a long-term investment, especially given that the network will extend to all of Luxembourg's rural areas.

## Business Case

### Investment:

Several hundred million euros funded completely by the operator. No public subsidies.

### Business model:

POST Luxembourg is a vertically integrated, state-owned network operator that is building an FTTH network to provide wholesale services to telecom operators in Luxembourg.

"Our return on investment strongly depends on the final investment and the take-up rates," says Bohnenberger, adding that the fibre unbundling price is €17.75 per fibre per month today.

POST Luxembourg's wholesale FTTH services include Fibre unbundling, Bitstream Access, and the possibility of collocation in the company's central offices and point of presence.

The operator, which received the green light from the regulator to offer FTTH retail services at the end of 2011, has seen a difference between how customers use copper

and fibre.

"If we compare a broadband customer on fibre to one on copper, we notice a strong increase in the downstream traffic and in the upstream traffic. Especially in the upstream direction, the changes are very marked. More and more content is being uploaded by fibre customers. The upstream capacity of fibre is a strong advantage," says Bohnenberger.



Competing cable companies already offer Docsis 3.0 services— providing high-speed Internet and TV services — to 70% of the population at speeds of up to 240 Mbps. In contrast POST Luxembourg offers VDSL services today only up to 100 Mbps. "We need fibre to remain competitive,"

## Services

### Telco as a Service:

Based on their years of experience in the Telco Applications domain, POST Luxembourg currently offers national and international operators Telecom Applications as a Service, including IPTV, VoIP (like Cloud PBX), Infrastructure as a Service, MVNE Services and Messaging.

says Bohnenberger.

POST Luxembourg continues to market services that can run over either VDSL or FTTH. "But of course we choose fibre wherever possible because only fibre can fully exploit the possibilities and all the offered features of our IPTV-Services, such as parallel streaming and recording of HD channels, 3D HD channels, fast VOD streaming on multiple TV sets," says Bohnenberger.

Bohnenberger adds that customers now have a greater and greater demand for speed, so Ultra-Fast Broadband is absolutely critical to our future, whether it is to bring more



Written in December 2015  
Photos provided by POST Luxembourg  
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# Makedonski Telekom

## Pioneering Macedonia's gigabit society

Incumbent takes the lead in Fibre-to-the-Home

The transition from a planned economy to a free market economy presented some challenges to the Republic of Macedonia. In 2001, its economy shrank 4.5 percent, but economic growth averaged 4 percent per year during 2003-06 and 5 percent per year during 2007-08. In 2007, Macedonia's IT market increased by a stunning 63.8% year-on-year.



Fibre has an important role to play in the country's fast-moving economic recovery. "Today, around half of the households in Macedonia have broadband Internet, one of the highest penetration rates in the region," explains Boro Petkoski, who leads the development team for new

FTTH products at incumbent Makedonski Telekom, a subsidiary of Deutsche Telekom. "At present, rollout mainly takes place in higher-density urban areas: the capital Skopje and the cities Ohrid, Tetovo, Kumanovo, Stip, Gostivar and Strumica, with more planned. FTTH roll-out began with a pilot project in 2008, followed by GPON technology deployment and the start of commercial sales in 2009."

### GROWING DEMAND

"About half of the cost of rolling-out FTTH is related to civil works, thereby creating new jobs and supporting the local economy, especially the construction industry," explains Boro Petkoski. "However, the implications for the country go far beyond this. FTTH supports the development of an information society and digital economy. Given the higher bandwidth capacity of FTTH, and its inherent capability for symmetrical download and upload speeds, customers can complete activities more quickly, and they can do things often not possible over other access technologies. This increases productivity and stimulates the economy



as a whole. Fibre is also opening opportunities for communication, education and entertainment for residential customers. Demand for FTTH-based services and higher bandwidth is set to grow, stimulated mostly by the increasing usage of high-definition video. If all mobile phones have a built-in HD video camera – and it's just a matter of time until this is the case – all video will be in HD, which

## Residential Customer Packages

**Triple-play:** high-speed Internet, IPTV & voice at EUR 29 per month

**Double-play:** high-speed Internet & voice starting at EUR 24 per month

**Stand-alone high-speed Internet packages** starting at EUR 29 per month (up to 40 Mbps symmetrical)

Incremental monthly fee for the residential packages is EUR 5 above the ADSL-based packages (up to 10 Mbps / 768 Kbps)

Packages include twice the monthly Internet traffic included with ADSL-based packages.

**Most popular:** 3 Max Optic triple-play. Customers appreciate the high access speeds, unique in the market and the HDTV content, especially sports. Makedonski Telekom is the first company in Macedonia to provide the UEFA Champions League, the 2010 FIFA World Cup and the Spanish soccer league in high-definition.



is a lot more bandwidth-hungry than standard-definition video.”

## IN THE LEAD

Makedonski Telekom is a fully integrated operator that builds and operates the network, provides services and finances the FTTH rollout on its own. Public subsidies are not available, and customers are not asked to pay up front. Depending on the location, obtaining construction permits to deploy fibre can sometimes be a challenge. That's why the incumbent considers it vital to plan ahead and start as early as possible, to avoid rollout delays.

## Business Customer Packages

**Double-play:** high-speed Internet & voice starting at EUR 49 per month

**Stand-alone high-speed Internet packages** starting at EUR 36 per month (up to 60 Mbps symmetrical)

Incremental monthly fee for the business Optic packages is EUR 11 above the ADSL-based packages (up to 16 Mbps / 1 Mbps)

Packages include twice the monthly Internet traffic included with ADSL-based packages.

**Most popular:** Office Complete Optic double-play, consisting of voice and high-speed Internet (up to 60 Mbps symmetrical).

Customers in Macedonia can now choose from a wide range of operators using ADSL2+ and cable TV service providers. These offer



broadband services at competitive rates within double-play, triple-play, and some within quad-play, packages. But user feedback shows consumers and professionals are more satisfied with high-speed Internet and IPTV services over FTTH than other access technologies. In fact, they are prepared to pay a premium for FTTH services, despite the very price-sensitive nature of the market.

## Innovative New Services

In 2010, a 'three-screen TV' offer was introduced, allowing customers to watch HD quality TV via IPTV, on the Web through their FTTH or ADSL connection, and on their mobile phone.

In 2011, over 300 high-speed Wi-Fi HotSpots were introduced in restaurants, shopping malls, buses, taxi cabs and other well-visited locations. FTTH, three-screen TV and HotSpots in buses and taxi cabs were all firsts in the Macedonian market introduced by Makedonski Telekom.



Written in June 2011  
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# Amsterdam Citynet

Already the cultural and financial capital of the Netherlands, Amsterdam is set to become the fibre capital too. Glasvezelnet Amsterdam (GNA), a consortium of private and public investors, has finished rolling out a fibre network to 43,000 homes and plans to connect the rest of the city.

Also known as Citynet, the Amsterdam project has been under intense scrutiny from other municipal and local authorities keen to replicate the pioneering business model. The experience with Citynet has also been used to inform Dutch FTTH regulatory policy, which is now well established and provides a good degree of certainty for new entrants wanting to build fibre networks.

It's been a long journey for Citynet, however. Back in 2001, the Amsterdam authorities recognised the importance of high-speed connectivity to the economic well-being of the city, and launched a formal investigation into the best way to proceed. City officials reasoned that the network would need to be operational in the 2010–2015 timeframe, but could take seven to nine years to build, so they needed to start straight away.

The first step was to find out if the incumbent operator KPN or the cable TV companies had any intention of deploying fibre in Amsterdam. This seemed a possibility in 2003, when KPN published the "Delta Plan Fibre" which outlined a vision for bringing fibre to the whole of the Netherlands in collaboration with the cable companies. The cable operators weren't interested (cable was fast enough, they claimed), and the plan was dropped. Following advice from Dutch and European regulators in 2004, Amsterdam municipality decided to create a public-private partnership (PPP) to invest in the passive fibre infrastructure only. This corporate structure was chosen to avoid contravening state aid rules, which prevent governments from making investments that distort markets and competition.

In late 2005 contracts were awarded for the construction and operation of the network. The physical network was to be

constructed by a consortium of local Dutch companies. Operator BBned won the contract to operate the electronic equipment in the exchanges and offer wholesale services.

The project finally became a reality in 2006 when GNA was incorporated, with three groups of investors — the municipality, the housing associations and the private sector— each investing €6m in return for a one third stake in the company. Another €12m in funding was provided as debt financing, bringing the total investment to €30m.

## General Information

Country: The Netherlands

City: Amsterdam

Population: 762,000

Network owner: Glasvezelnet Amsterdam (GNA)\*

Name of project: Citynet

*\* GNA was originally set up with one-third share from each of the municipal authority, the housing corporations and private investors. Housing corporations were Ymere, Stadgenoot, Rochdale and De Key. Private investors were ING Real Estate and Reggefiber. Later on ING Real Estate sold its share to Reggefiber, and in February 2009 Reggefiber formed a joint venture with KPN, while increasing its share in GNA to 70% with the city and the housing associations now owning the remaining 30%.*

## Deployment

**Size of network:** 43,000 homes passed / 10,000 connected/ 4,000 activated [end 2009]

**Technology/architecture:** A point-to-point fibre topology (also called "home run") was selected because it offers total flexibility in selection of equipment – any technology can be supported including Ethernet and PON. The technology is Ethernet with analogue cable TV on a second fibre.

**Deployment method:** direct buried cables and 96-fibre ducted cables

**Time to deploy:** Phase one to connect 40,000 homes took 2.5 years, finishing in February 2009. Plans for connecting the rest of the city are underway with an expected completion date of 2015.

**More information:** [How Amsterdam was wired for open access fibre](#) – article in Ars Technica by Herman Wagter, fibre evangelist at GNA.



Once construction was underway, GNA faced a new challenge: how to roll out the network in a densely populated old city while causing minimum disruption. "Doing fibre to the home in a dense old city is one of the biggest challenges there is, and everyone wants to know how we're doing it," said Herman Wagter, former project director and now business development manager of GNA.

Asked to single out one challenge above all others, Wagter picked the difficulties in wiring up home and office buildings with multiple occupants. In dense cities like Amsterdam, approximately 90% of all buildings are multi-dwelling units, with anywhere from two to 500 individual apartments per building. The technical challenge is to get the fibres distributed from the basement or street level up to each individual apartment.

## Business Case

Investment: €30 million to connect the first 40,000 addresses.

Business model: horizontally separated, open access network

Network owner: Glasvezelnet Amsterdam (GNA) <http://www.glasvezelamsterdam.nl/>

Network operator: BBned <http://www.bbned.nl> was granted exclusivity until October 2009, but the network now has multiple operators. KPN <http://www.kpn.nl> started as an operator on the network in 2010.

"Nobody has given much thought to deploying new fibre cables inside existing apartment buildings, and it shows," he says. "Most buildings had to be surveyed from the inside to get any idea of what has to be done to distribute the fibre cabling to each apartment."

There is also a co-ordination challenge. Around half of Amsterdam housing is owned by housing associations, but for the remaining 50%, individual agreements must be negotiated with home owners before construction work can start. In the worst-case scenario, where there is no access to upper floors through shared areas, all the occupants of the building must be at home on the same day when the installer calls.

The roll-out to 10% of the city was seen as a necessary step in the process of learning how to deploy FTTH, before the entire city could be taken on. However, the biggest challenges the network has faced were not in construction, but in bringing together the right partners under the right conditions for investment, taking a total of five years from the initial idea to laying the first cable. Citynet was also challenged in court twice by cable operator UPC, and it took three years to get regulatory approval from the European Commission.

Eventually, in December 2007, the Commission ruled that the investment was not State aid because it met the terms of the Market Economy Investor Principle. In other words, the city of Amsterdam was permitted to invest in the network providing that substantial private investment was made at the same time and on the same terms.

In terms of commercial success, Citynet discovered that customers preferred competitive services in a multi-operator



market. Owing to limited funding by parent company Telecom Italia, this was something wholesale operator BBned could not support on its own. Therefore, GNA struck a deal with KPN, with the result that KPN also became a wholesale operator on the network in 2010.

In parallel, the Reggefiber Group, which is a shareholder of GNA, was thinking of joining forces with KPN to deploy fibre across the whole of the Netherlands. The Dutch competition authority NMa and telecoms regulator OPTA joined the negotiations because they wanted to create a framework that would guarantee equal access to service providers and infrastructure competition without holding back investment. The desire to include the public-private partnership of GNA in this framework prolonged the discussions with the regulators until the end of 2009, at which point Reggefiber was able to increase its share in GNA to 70% and let GNA enjoy the economies of scale that Reggefiber can achieve.

## End-user Services

Service providers: ISPs on the network include Alice (part of Telecom Italia), Concepts ICT, InterNLnet, Tweak and KPN. Internet, double and triple-play packages are available, as well as services from other providers such as internet telephony and online backup.

What's the cost? Alice Comfort Plus provides 20 Mbps symmetric broadband, unlimited telephone calls within the Netherlands, 39 TV channels and 25 radio stations for €44.50 per month. InterNLnet offers 100 Mbps symmetric broadband only for €119.95 per month [prices correct on 10/6/2010].

Customer feedback: The Internet services are appreciated by the end-users. The lack of digital and HDTV offerings in the TV package supplied by BBned has been a source of complaints. An upgrade to a more competitive TV offering is expected in 2010.

One unfortunate side-effect of the discussions with the regulators was that many business decisions had to wait until the regulatory framework had been settled. This stalled further roll-out until the beginning of 2010, but deployment has now restarted in earnest, with the target of connecting another 100,000 addresses by the end of 2012.

Written in August 2010  
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## Rewards trump risk in Norway's hot fibre market

*How Lyse Energi turned a competitive threat into a profitable opportunity*

It has been 12 years since Lyse Energi, a Norwegian regional energy supplier, decided to enter the communications market, and to do so using the most advanced, state of the art networking technology available – point-to-point Ethernet over optical fibre with symmetrical speeds up and down the network.

### General Information

**Homes passed:** 360,000

**Total homes:** 2,200,000 plus 450,000 holiday homes

**Total subscribers:** 304,000 plus 16,000 in Denmark

**Penetration of fibre market:** 73%

**Penetration of total homes market:** 14%

Altibox claims 73% of all 414,000 FTTH subscribers in Norway

With only 2.2 million households, Norway's communications market is small and, with at least seven telcos, saturated with competition. But Lyse's gamble is paying off, and fibre is now the fastest growing access technology in Norway.

After spending nearly NOK2bn (€264.3m) on plant and equipment, Lyse now holds 40% of the Norwegian fibre market directly, and another 30-35% through resellers and partners. Through Altibox, its wholly-owned broadband subsidiary, Lyse now claims 320,000 broadband customers, more than twice its energy customers. This gives it about 17% of the total Norwegian broadband market, at a penetration rate of around 60% of homes passed.



Altibox puts this success down to the strength of the 42 partnerships, 36 in Norway and six in Denmark, that Lyse has formed with other regional power utilities on fibre-based broadband, and their willingness to be patient investors.

Lyse developed Altibox in response to deregulation in the power sector. This was a fibre-based triple-play (high speed internet, TV and voice), with extras, that it could sell to its own energy customers, and through other regional power companies. Telecommunications was a natural fit because it was an infrastructure play, and Lyse was expert at installing and operating infrastructure.

Lyse chose point-to-point Ethernet over fibre because of its flexibility. "This has proven to be a future-proof strategic choice, allowing for the high bandwidths today's and tomorrow's customers are expecting," Altibox CEO Nils Arne Bakke says. But it's not cheap to build infrastructure to reach new customers, and the Altibox partnership continuously puts great effort into improving best practices for building. Mr Bakke says they have managed to get average build cost per customer down by 30% over the years, to about NOK 21,000 (€2,500). This is still a significant cost, so network construction won't start in a new area unless it is close to an existing point of presence, and up to 60% of potential subscribers sign up. Allowing residents to cut their connection costs by digging their own trenches (to an Altibox specification) helps to win commitment.

Altibox continues to increase the raw speed on the network. Starting in 2002 with 2Mbps, after several upgrades, it launched a 400Mbps service in 2010, and raised its basic





rate to 25Mbps. “The next step is 1Gbps homes,” says Mr Bakke.

After beginning with 40, Altibox now offers 150 TV channels as well as games, football, on-demand services such as films, personal video recording, 3D, business video and interactive multi-screen services. In addition, more customers are uploading their own video to sites such as YouTube.

## Financials

	2010	2011	2012
Sales (NOK m)	1900	2300	2580
Sales (EUR m)	226	274	307

“Internet traffic in the home is increasing 30 - 40% yearly due to new Internet services, next-generation TV services and a significant change in customer online behavior,” Mr Bakke says. “Fibre is unarguably the best medium for handling this increase.”

Altibox has for 4 consecutive years won Norway’s most prestigious award for customer satisfaction (EPSI) in broadband and TV services. The company is currently focusing on improving the WiFi-experience in the homes, as customers are increasingly accessing Internet through wireless devices. “We provide customers with the best Internet access in the market, and we want to make sure they get the very best experience, even when using wireless devices,” says Mr Bakke.

Customers have a wide range of prices, services and packages. The average revenue per user is between NOK 750 (€99) and NOK 800 (€106) per month. Which is not much unless you are a patient investor. So the aim is to extend the present network and upsell existing customers. Mr Bakke says that in its home market around Stavanger, the company is cash positive and heading towards its best results since the start in 2002. In other regions, the partners have different investment criteria, with pay-back periods as low as eight years and as high as 12.



Altibox and Lyse are not resting on their laurels. They are aiming for higher penetration in the business segment, with main focus on smaller businesses and capitalizing



on existing infrastructure. They have built a national core network, and there are fibre links to Stockholm and Copenhagen with spare capacity. The emerging smart grid to manage households’ energy consumption is another opportunity.

Lyse has organized telecommunications operations into:

- Altibox, to develop fibre-based content products and sell them to Lyse subsidiaries and partners, in effect wholesaling the Altibox concept to third parties;
- Lyse Smart, to develop solutions for smarter homes;
- Lyse Fiber, to build and operate broadband networks, connecting and managing the customers;
- Lyse AS, to manage customer service and invoicing;
- NorAlarm, which makes and sells remote fire and burglar alarm systems; and
- Lyse Fiberinvest, a company to manage partner and subsidiary relationships;

## End-user Services:

**Internet:** 25Mbps to 1Gbps symmetrical

**TV:** 150 channels, Radio, VOD/POD/EOD, Interactive portal, Games, Guide, Football (Premier and Norway leagues), High Definition, Local news, Personal video recorder, etc.

**IP Telephony:** Two lines, answering machine, Connect, Block filter

**Alarms:** Fire, Burglary

**Mobile:** Smart family, Apps

**Future:** Next-generation TV services, 1Gbps homes as a standard, Interactive equipment, Cloud services, Health & safety, Energy Management

Most companies are a product of their unique market ecosystems, so is Altibox’s success repeatable elsewhere? Mr Bakke is sure a similar venture could be reproduced in other countries.

Written in September 2011 / Updated in January 2014

Photos provided by Altibox

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# ATB NETT

## Small local operators cooperate for mutual advantage.

Norway is a global leader in the deployment of FTTH, and has relied on some innovative business models to achieve this status.

Norway has enjoyed huge success with the extension of fibre access networks into homes and businesses, and remains one of the countries other economies in Europe look to as an example.

### General Information

#### Infrastructure owner:

ATB-Nett is a collaboration of six networks owned by five utilities (Numedal Fiber, Drangedal Everk, Telefiber, Tinn Bynett, Samnett), and one local community organisation (Bykle Breiband). Each owner continues to operate its own network.

#### Location:

The rural districts of Agder, Telemark and Buskerud, made up of the municipalities of Bykle, Numedal, Tinn, Bø, Kvitseid, Drangedal, to the west of Norway's capital Oslo.

#### Network status:

Operational, and looking to expand into new neighbouring areas

#### Service providers:

Six different ISPs (a mix of local and national brands).

#### Strategic partners:

NetNordic Bredband for access, HomeBase for content

But not all of this pioneering work has been the responsibility of traditional telecoms companies. It is common in Norway for organisations with no telecoms history, utility companies for example, to construct fibre access networks, and operate them alongside their regular lines of business.

One example of this trend is ATB-Nett, a joint venture established at the end of 2009 by six companies, mostly utilities, active in the same region of the country. Each of the partners in ATB-Nett has for years owned and operated its own fibre access network, but now by collaborating they are jointly able to achieve the economies of scale of a much larger organisation.

#### Ahead of the game



Harald Kinck, Managing Director of ATB-Nett, says that FTTH deployment in Norway began in the capital Oslo in around 2000, along with Sweden and well ahead of most of the rest of the world.

Before long more outlying districts, like Agder, Telemark and Buskerud which ATB-Nett serves, began to realise that fibre access had the power to improve lives and boost regional economic prospects.

"We were looking at who could deploy fibre for us," he recalls.

"National incumbent telco Telenor was one of the contenders.



But they had recently converted to become a publicly quoted company, and there was concern that shareholder priority might be early payback on their investment. There was also the worry that such a big company might end up not wanting to invest much money as this is a region with a small population. The authorities here started to look locally to see who would be able to build fibre broadband."

### Deployment

#### Size of network:

15,000 homes passed so far, and 3,500 subscribers signed up. The region covered by ATB-Nett has around 22,500 private primary residences and 30,500 holiday properties.

#### Technology/architecture:

P2P FTTH and Ethernet, as well as a small proportion of GPON. Some DSL and cable is also available in the region.

#### Network speed:

Up to 100Mbit/s, dependent on service and provider

In 2000, a number of regional electric companies took up the challenge and started laying fibre alongside their power lines: "It's traditional in Norway for electric companies to be locally owned and to serve a small region," explains Kinck. "This region produces around five per cent of Norway's electrical power production. Lots of power plants means that there's plenty of money to invest in fibre. Suddenly there was a lot of connectivity being offered."

Fibre access was initially extended to public sector offices and local businesses – not homes at this early stage.

"This is not a major residential region, with more holiday homes than regular homes," says Kinck. "When fibre construction

started, there were parts of the region with no Internet access at all, just a few ISDN lines if anything. It was an unusual deployment, in the sense that fibre is generally laid in regions with a higher population.”

What limited further development, after this initial burst of activity, was that in acting alone the individual energy and utility companies found they lacked the necessary muscle, customer base and expertise to really drive take-up of

## Business Case

### **Investment:**

10,000 to 25,000 Norwegian Krone (approx 1,250 Euro to 3,200 Euro) per house depending on location.

### **Public subsidy: 0**

### **Business model:**

Open/hybrid network access at fibre, capacity and service level.

services in their communities.

Now working together as ATB-Nett, a route chosen in preference to merging, they can achieve lower operating costs, as well as reduced purchasing costs in areas like content. The heavier of the investments that need to be made, and the accompanying risk, are all shared.

Looking forward, the plan is now for ATB-Nett to help foster the development of coordinated and competitive broadband services in the region, and to establish an open network structure to pave the way for a cost-effective collaboration between network operators and providers of those services.

ATB-Nett members are already further developing infrastructure throughout the region, optimising the use of fibre and maximising investment funds. All parties involved are now working to exploit each other's local strengths and competencies to ensure the community's common goals. This cooperation across municipal boundaries is helping ensure local value creation, and also means less impact on the environment.



Residences, as well as businesses and government offices, are also now beneficiaries of the rollout: “Anyone in the region can have fibre if they want it – a nice dividend for people who live this far from a major town,” says



Kinck. “Demand for fibre is quite high, with up to 90% of people subscribing in some areas. It depends a bit of the demographic. In Norway, fibre is generally priced only a tiny bit higher than DSL, so it's not a difficult decision in some respects. You pay the equivalent of 45 Euro a month for DSL and 55 Euro for fibre, giving you much higher speeds. People can afford fibre easily, particularly enjoying triple play services.”

He says ATB-Nett is actively looking for more partner organisations in neighbouring areas to extend its reach and increase synergies.

## End-user Services

### **Available Services:**

Various packages including IPTV, Internet and VoIP, mainly sold as double or triple play solutions.

### **Cost of Services:**

Depending on the package and the supplier, between 300 and 850 Norwegian Krone. For more information, go to [www.atb-nett.no](http://www.atb-nett.no)

“Because we are locally based, our focus is on local people and businesses,” he believes. “Bigger companies are focused on profit only. We're in this for the long term, prepared to allow more time to get our investment back. This local ownership model is common in Norway. We're working to improve things the whole time, to lower costs, to make more products available and to increase speeds. We're now looking at a local IPTV product. An outside company wanted to charge a lot of money for the equipment, so we've set up our own package that offers much better value.”

Written in July 2011

With support from bmp Telecommunications Consultants  
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# IT-Norrbotten

## FTTH CASE STUDY

## County-wide fibre backbone connecting municipal networks

*IT-Norrbotten brings high-speed fibre connectivity to rural areas in Sweden's northernmost county, enabling small towns to thrive.*

With a population density of just 2.6 inhabitants per square kilometre, the county of Norrbotten in Sweden is one of the most sparsely populated regions in Europe. Population centres are small (most have between 3 000 and 10 000 inhabitants) and the distances between them are long. "There is no interest from commercial operators to take broadband to rural areas, but for us it is a matter of survival," said Tony Blomqvist, chief executive of IT-Norrbotten.

### General information

**Project promoter:** IT-Norrbotten

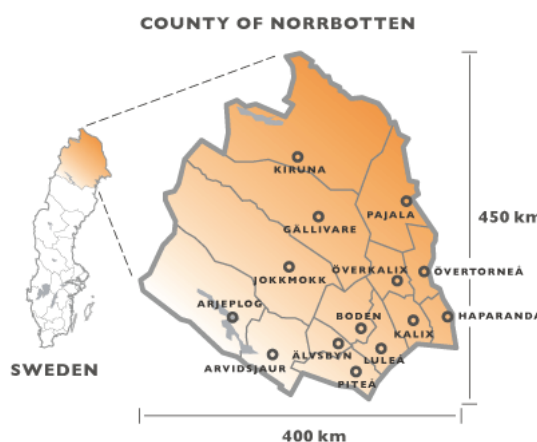
**Location:** Sweden

**Project name:** Broadband network - Lumiora

**Network size:** 3500km

IT-Norrbotten was created in 1996 by the municipalities of Norrbotten, Luleå University of Technology, and Norrbotten County Council together with the County Administrative Board. (Since 2005 the company has been owned by the 14 municipalities of Norrbotten and Norrbotten County Council.) In the late 1990s the Swedish government decided to encourage development of IT infrastructure to counter regional imbalances between the sparsely populated north and the more densely populated south of the country. IT-Norrbotten was given the task of coordinating the building of broadband networks for the 14 municipalities in Norrbotten, which were built between 2001 and 2006.

At the same time IT-Norrbotten planned and built the regional backbone, which connects the municipal-owned networks or "stadsnät". The regional backbone, called "Lumiora", is a resilient dark fibre network that links all the population centres in the county. The network provides connectivity to local authority sites such as schools, hospitals and administrative centres and to the municipal networks. As well as managing



the network for the public sector, IT-Norrbotten sells business-grade services and wholesale connectivity (Ethernet, wavelengths and dark fibre) to large businesses and telecoms operators.

To improve broadband services to residential properties in northern Sweden, in 2008 IT-Norrbotten signed a framework agreement with communications provider OpenNet. The framework provides an opportunity for each municipality to contract with OpenNet. "We chose OpenNet because it has a well developed model for the promotion and development of urban networks and extensive experience in similar assignments," explained Blomqvist.

OpenNet operates the urban networks, but does not provide any services of its own. Instead, it invites retail service providers onto the network, who then provide the services and content for the end users. This is good for the consumer because it creates a competitive retail environment in which they have a choice of service providers. Customers can change provider at short notice, and even have different providers for Internet, telephone and TV if they wish. It is also good for service providers because they get access to a large number of urban networks in Sweden and can expand without major infrastructure investments.



### Deployment & Take Up

#### Technology/architecture:

Lumiora is a regional backbone (dark fibre) network

#### Time to deploy:

2001 to 2006

**Municipal networks connected to Lumiora:** Arjeplog, Arvidsjaur, Gällivare, Haparanda, Jokkmokk, Kiruna, Pajala, Övertorneå and Övertorneå (98% of homes in the county have access to broadband).

Being owned by the public sector, IT-Norrbotten is motivated not just by commercial interests, but also by the benefits that high-speed networks bring to society. The Lumiora network enables local government to work more efficiently, and has brought significant improvements to how the county council delivers healthcare and education services.

IT-Norrbotten has linked municipal administrations with the County Council in a joint platform for distance meetings. This opens up new possibilities for cooperation between municipalities and county councils. The administration of the Association of Local Authorities was first off the mark, and now conducts the majority of its meetings long distance. In the same way, municipal chief executives, council leaders and other chief officers often meet digitally. Travel is reduced, saving time, money and the environment.

## Business Case

**Total cost:** ~€73M invested in IT infrastructure including ~ €7M from EU structural funds

**Who runs the network:** IT-Norrbotten (regional backbone), OpenNet (municipal networks).

Norrbotten County Council is responsible for health, medical and dental care. With the help of IT-Norrbotten, the council has linked the county's five hospitals, 33 health centres and 34 dental clinics. A number of services have been improved by the fibre network: electronic prescriptions, patient record systems, digitised X-ray handling, virtual meetings and IP telephony.

Virtual meetings are widely used in healthcare, typically to allow local doctors to access consultants in larger hospitals. For example, a consultant dermatologist can see the problem areas of a patient's skin and diagnose them remotely; ear surgeries are performed at local hospitals with the help of specialists from the regional hospital at Luleå working at a distance; with videoconference it is



possible to "borrow" doctors from other hospitals to help overcome a shortage of doctors in adult psychiatry, for example.

Another exciting use of the technology is to monitor premature babies when they first go home. Families with premature babies often stay in hospital for a long time and feel unsafe and insecure when they finally go home. To ease the transition, the parents can borrow videoconference equipment and use it to stay in touch with the hospital. The personnel at the hospital can see the baby over the video link and give their recommendations to the parents at home.

## End-user Services

**Residential:** consumers have a choice of supplier for broadband, TV and phone services, available through OpenNet – [www.norrbotten.opennet.se](http://www.norrbotten.opennet.se)

**Business:** IT-Norrbotten offers wholesale services to other operators, as well as business-grade services direct to local businesses and the county council.

In education, videoconferencing is used for remote learning. Pupils in Norrbotten are entitled to mother-tongue lessons in more than 91 languages, but there are not enough qualified teachers in each town to cover so many languages. Instead, pupils from different language areas have virtual meetings for learning and practising their mother tongue. This takes place during the school day together with pupils from other schools across the county. Through sound and image, the teacher communicates with the pupils in the schools that are participating in the session. The technology makes it possible to coordinate mother-tongue teaching, and to hire qualified teachers for all the languages.



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# Portugal Telecom

## Incumbent gains competitive advantage with FTTH

Portugal has become one of the most active FTTH markets in Europe and the incumbent operator Portugal Telecom (PT) is at the centre of the action.

With each household having nearly three TV sets on average, the pay TV market in Portugal is extremely important for both cable and telecoms operators. PT had already launched IPTV services in 2007 over its upgraded DSL networks, but with cable operators starting to offer high-speed broadband and voice services in addition to TV, a more aggressive strategy was called for.



The answer was fibre-to-the-home. The high capacity and high reliability of optical fibre enable PT to deliver a robust TV offering with a wide range of TV channels and on-demand, personalised video services across multiple platforms (PC, TV and mobile). More choice and a better customer experience are obvious benefits. Although perhaps less obvious, the widespread availability of optical fibre in urban areas will make it easier and cheaper to roll out next-generation mobile networks using LTE, which require fibre connectivity to base stations.

PT's decision to invest in FTTH was assisted by the early adoption of next-generation access (NGA) regulation. The national regulator, ANACOM, has adopted a segmented model: in urban areas where there is plenty of competition for broadband and telephone services, there is only light regulation, which means that PT is not forced to provide wholesale services to competitors.



Deployment of FTTH in urban areas started in 2008. "Fibre is not new to us, we have been doing fibre for more than ten years," said Luis Alveirinho, director of network planning and implementation at PT. "But we are moving from thousands of connections with fibre to millions of connections – this is a totally new paradigm."

Over a period of roughly 12 months PT has passed 1 million homes with FTTH – the operator only considers a home to be "passed" when fibre is available outside the customer's door, not merely outside the building. Having identified a commercially attractive area for the deployment, PT first carries out a detailed site survey, which informs the technical design and optimisation of the network.



Some technical decisions, like the selection of GPON, were straightforward according to Alveirinho. The use of passive optical network technology relaxes the requirements for space in the central office, space in ducts, lowers energy requirements and reduces technical complexity, he says.

PT knew from the beginning that it would need to present signals to multiple TV sets in the same household in a cost effective way. This can be done using the broadcast capabilities of a GPON system, by carrying the analogue TV signals on a

## Deployment

### Size of network:

1.6 million homes passed at the end of 2011, equivalent to 40% of primary households in Portugal (1.600.000/3.997.378) and to 27% of total households in Portugal (1.600.000/5.877.991).

### Technology/architecture:

GPON with RF overlay for analogue TV services.

### Deployment method:

Fibre deployment targeted mainly at areas where ducts are available and high take rates are expected.

### Time to deploy:

Deployment started in 2008 and finished one year later; extension of the network is being evaluated.





third wavelength in the system. The analogue TV signal is then distributed around the home using the existing coaxial cabling, avoiding the need to supply multiple set-top boxes.

## Business Case

### Investment:

PT claims the cost per home passed “is very good compared with available international benchmarking values”. Use of existing ducts and very competitive labour rates in Portugal help to keep costs down.

### Number of years to ROI:

“The better service experience we are providing to our customers and the service uptake is very promising in terms of the business case for FTTH,” says PT. The operator views FTTH as a long-term, transformational investment.

### Business model:

Vertically integrated – PT builds, operates and sells services on the network

Other decisions were more complex. A major topic of discussion was where to site the next-generation POPs. Central offices in urban areas usually serve homes no further than 2–3 km away, but fibre can easily reach 10 km, giving the operator the opportunity to reduce, in the medium term, the number of central offices from a few thousand down to several hundred.

The vertical cabling – getting fibre distributed to individual homes inside apartment blocks – was also challenging, often because the cable TV operators had got there first and the service ducts in the buildings were already occupied. In other cases, in older homes, there were no ducts available at all and so PT needed to use facade cable, running it along the outside of the building.



PT paid special attention to the design rules for in-building cabling and the network test/acceptance procedures, so that technicians could install cabling quickly and efficiently, and with minimum disruption to the customer. “You cannot say to the customer, I’m here to install your fibre and by the way you need to provide breakfast, lunch and dinner,” Alveirinho quipped.



By optimising its processes and all support systems over a period of 15 weeks, the average installation time was reduced from 5–6 hours down to about 4 hours. The use of bend-insensitive fibre, strong technician training and strict technical procedures for installation were all critical to achieving fast, high-quality installation both inside the building and inside the customer’s apartment.

With strong competition from cable companies in the areas where PT is deploying fibre, good customer service is vital. In terms of attracting and retaining customers, Alveirinho believes an operator has two main choices: it can offer premium packages or offer unique services and content. PT says it is doing all of these things.

## End-user Services

### Services:

Wide range of packages from €30.99 to €179.99, including quadruple play packages with TV (from 15 to 130 channels), Fixed Broadband service (from 6Mbps/1Mbps to 400Mbps/40Mbps), Mobile Broadband service (100MB free) and fixed voice service - from €32.49/month to €179.99/month.

For MEO packages info go to: [www.meo.pt/ADERIR/FIBRA/PACOTES/Pages/tvnetvoz.aspx](http://www.meo.pt/ADERIR/FIBRA/PACOTES/Pages/tvnetvoz.aspx)

The “Meo” brand IPTV services come packaged with unlimited internet, unlimited voice and 100MB of free mobile broadband. PT is also trying out innovative new products – for example, a mobile app allows customers to access the electronic programme guide from their mobile phones, so they can set the set-top box to record a program when they are out of the house.

The strategy seems to be working. “Since the launch of the service in April 2008 we have collected 28.7% of the pay TV market and earlier this year we made the first event available in 3D in Portugal,” Alveirinho said. The operator is currently evaluating where and when to extend the coverage, and developing new IPTV products that will help to strengthen its position in the market.

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### Russia's first mass cable-TV and broadband internet access network using FTTB

Cable TV operator ER-Telecom has installed fibre-to-the-building networks in 31 Russian cities, bringing high-speed internet within reach of 5 million homes.

Russia is the fastest growing FTTH market on the European continent. This is partly due to the size of its population, but is mainly the result of the increasing competition between the incumbent telephone operators and the cable TV industry, especially in large cities.

## General Information

**Project promoter:** ER-Telecom [www.ertelecom.ru/](http://www.ertelecom.ru/)

**Country:** Russia **City:** Perm

**Project name:** Urban Universal Telecom Networks (UUTN)

ER-Telecom was created in March 2001 by merging telephone operator EL-Svyaz with internet service provider Raid-Internet, which had been operating in the city of Perm since 1997. Located in the European part of Russia near the Ural Mountains, Perm is an industrial city with nearly 1 million inhabitants. Andrey Semerikov, chief executive of ER-Telecom, wanted to provide all of them with high-speed internet access. Semerikov's vision was not just about opening up the opportunities of the World Wide Web; he wanted to break the monopoly of the legacy telecom operator in the region. To do this, ER-Telecom felt it was necessary to build its own telecom network and selected fibre-to-the-building (FTTB) and cable TV technology. Thus the project "Urban Universal Telecom Networks" (UUTN) was conceived – the first of its kind in Russia.

ER-Telecom presented its project at the Venture Fair in Perm in 2003, where it won an award, and secured the venture capital financing needed to get the project underway. Construction of the UUTN began later the same year, with the aim of providing 200,000 homes in Perm with cable TV and broadband internet access.



Following the successful launch in Perm in 2004, ER-Telecom rolled-out networks in five more cities in 2005 – Samara, Volzhsky, Volgograd, Tyumen and Penza. Perm Financial and Industrial Group acquired a controlling stake in the company in 2006, and the funds were directed to the roll-out in an additional 11 cities. New networks were deployed in Penza, Kirov, Ioshkar-Ola, Kazan, Chelyabinsk, Tyumen, Omsk and Orenburg. ER-Telecom also purchased two local operators in

Izhevsk, Naberezhnye Chelny and Nizhnekamsk and upgraded their telecom networks.

FTTB is ideally suited to Russian cities, where most people live in apartment blocks containing 100 households on average. ER-Telecom will install the network in a block of flats when two thirds of the owners have voted for it. Consumers are not charged much for the connection (less than the monthly fee); it is even free of charge in some special offers.

## Deployment

**Size of network:** 4,8 million households passed / 3 million activated (May 2011) in 31 Russian cities: <http://www.ertelecom.ru/en/cities>.

**Technology/architecture:** The network is DOCSIS 3.0 cable-TV system over a FTTB network. Networks installed prior to 2008 have a three-level ring structure for redundancy with two fibres per ring. Those installed from 2008 onwards have a two-level ring with a single fibre. Inside the buildings, coaxial cable is used to distribute TV services, and FTP-cable for internet and IP telephony.

**Deployment method:** ER-Telecom uses aerial cable along the municipal electricity transmission lines because it is easier and faster to deploy.

**Time to deploy:** All business processes are optimised and standardised. It takes 4 months to build a complete optical fibre line in a new city and start to provide telecom services.

The network was based on a three-tier structure for the outside plant. A packet of cable channels is received at the main station (called the broadcast head-end) located in the centre of the city, and is transmitted in digital format via optical cables to the aggregation switch in the connected districts. From there, the packet of TV channels is delivered to the apartment buildings via more optical cable, where the signal terminates at an optical converter, usually located in the basement of each building.

The output of the optical converter is connected to coaxial cable. To ensure signal quality in each apartment, new metallic and plastic ducts and panels are mounted inside the building, and an individual cable is laid from the converter to each apartment. The signal path is exclusively via cables, from the broadcast head-end to the subscriber's wall-socket.

The optical fibre coming into the building is also used to connect subscribers to the internet. Distribution inside the building is via a foiled twisted-pair (FTP) cable that can sustain a data rate of 1 Gbps. To connect to the internet, a PPPoE (Ethernet) connection is configured on the consumer's PC or other device; no additional equipment is required. As well as providing access to external internet resources, the connection gives users access to the city network with preferential rates for "in-network" traffic, as well as a variety of multimedia resources.

ER-Telecom has streamlined and optimised the deployment process with each city that it connects. "As ER-Telecom already

has 31 projects in different cities there is much opportunity to practice and improve every detail of deployment,” said Sergey Gusev, ER-Telecoms’ technical director. “The most effective methods for each stage of deployment



were worked out through the first cities connected. Now we just practice uniformity in every new city.”

In 2006, ER-Telecom started to expand the range of services it was offering, beginning with digital TV and fixed-line telephony, which made it possible to offer the full range of triple-play service packages. In the first year, ER-Telecom added 50,000 telephony subscribers, about 95% of which

were captured from other operators, it claims. ER-Telecom also launched a distribution system for digital content, including a game portal ([www.citygamer.ru](http://www.citygamer.ru)), a musical portal ([www.citytunes.ru](http://www.citytunes.ru)).

## End-User Services

**Service providers:** ER-Telecom is a vertically integrated operator, providing cable TV, internet access and telephony.

**Services:** For domestic subscribers ER-Telecom provides ‘Divan TV’ (cable TV), ‘Divan TV Plus’ (digital cable TV), ‘Dom.ru’ (broadband internet access) and ‘Gorsvyaz’ (telephony). Double and triple-play packages are also available. For business purposes all services are sold under the brand ‘ER-Telecom’. ER-Telecom offers its own united multimedia portal with low prices and easy payment system: <http://turbodom.ru/>.

**What is the cost?** The triple-play package costs RUB 555 (approx. €13) per month. Standalone services cost between €6 and €17 per month.

By 2007 ER-Telecom’s network had reached 1.3 million households, the company had signed up 360,000 subscribers, and the Board of Directors approved a long-term strategy for the second phase of the company’s FTTB deployment, in 2008–2014. To make this happen, the operator needed new financing. ER-Telecom Holding was restructured, and 100% of all the shares of the subsidiaries were consolidated. Perm Financial and Industrial Group carried out an additional issue (redemption) of the shares of ER-Telecom Holding in the amount of RUB 3.9 billion to increase the company’s equity capital to RUB 4.5 billion. By 2008, ER-Telecom reached a milestone when it began to generate an operating profit in the 17 cities in the first phase of deployment. The second phase of deployment was already underway with the aim of reaching 26 more cities by 2013. The network design was revised in light of technological advances: the company now installs a two-



level network, which needs more fibre, but provides higher capacity per customer, and has less equipment to maintain in the field, which reduces operating costs.

Today the company has 3 million subscribers across 31 Russian cities. Of these, 1.3 million receive its cable TV services, and 1.5 million receive broadband internet access. The share of the Russian pay-TV and broadband internet access markets stands at 8.3% and 8.5% respectively, making ER-Telecom the fourth largest cable-TV operator in Russia. “It is astounding how small and potentially risky project has turned into a big inter-regional company,” said Gusev.

## Social Responsibility

The company has also implemented several social responsibility projects that demonstrate the utility of the FTTB network:

**Safe City:** video-monitoring of crossroads and public places in order to maintain public order and improve crime detection;

**City Education Network:** a teacher-student-parent communication environment with e-textbooks and courseware, education and teaching resources, distant learning, cooperation with higher education institutions;

**E-City Network:** an interaction system for city authorities, business and population; constant monitoring of social and economic development of the city and public opinion surveys; consultations and open meetings; a dialogue between citizens and city authorities; environment control and emergency alert systems;

**Telemedicine:** a comprehensive use of telecom network capacities in healthcare: appointments via internet; consultations without visiting several hospitals; emergency consultations with specialists;

**Housing and Communal Services Telemetry:** efficient control and recording of tenant services (for suppliers and consumers); payment accounts based on actual consumption (for citizens).

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Photos provided by ER Telecom  
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## Regional government scheme to eliminate the digital divide

*The Government of the Principality of Asturias took the unusual step of setting up a public operator to provide FTTH to small towns that traditional telecoms providers had ignored.*

The Principality of Asturias is an autonomous community situated on the Spanish north coast. In the recent past, many small towns have suffered an industrial decline, as traditional forms of employment based around mines, small farms, fishing and shipbuilding have had to adapt, sometimes quite traumatically, to the global economy.

It has long been recognised that public investment in rural and small towns is a driver of economic and social development. If it is right for other infrastructures (roads, parking, airports), then why not telecommunication infrastructures? This was the logic behind the decision of the Principality of Asturias to improve the communications infrastructure in the mining valleys. The aim was to give the rural population access to the same services as offered in the bigger cities, and eliminate the “digital divide”.



### General information

**Project promoter:**

Government of the Principality of Asturias

**Project developer:**

GITPA (100% owned by the Government of Asturias)

**Location:** Principality of Asturias, Spain

**Project name:** ASTURCÓN Network

**Network status:** Operational

The new access network would be open to all service providers and managed by a public operator. This business model was chosen because the local authorities wanted to separate the infrastructure from the services: public investment “builds the roads” and private investment can then “add the cars”. This approach is approved by the European Union because it does not distort markets.

One reason for lack of investment by commercial telecoms providers was the mountainous geography of the Asturias region. The settlements of the mining valleys were small and distributed, and many telephone lines were too long to support ADSL technology. Finding a solution to this technological challenge ultimately led to creation of the first FTTH network in Spain.

The initial budget was €18.7M, which included the creation of the public operator, Gestión de Infraestructuras Públicas de Telecomunicación del Principado de Asturias (GITPA). 60% of funding came from the European Regional Development Fund (Fondo Europeo de Desarrollo Regional or FEDER) and 40% came from a national fund for the regeneration of former

mining communities. The original scope of the project was to cover around 31,000 homes in towns of more than 1000 people and with one or no broadband access network. The first phase of deployment to reach 21 communities in the mining valleys of Nalón, Caudal and Narcea took place between 2005 and 2007.

The network has been extended several times as new sources of funding become available. The “Llanes, Paraíso Digital” project, under the National AVANZA Plan extended the network to around 1500 homes in central Llanes in 2007. In 2008, using the Regional ACEBA fund, there was a major expansion to 19 more communities over a period of three years – a total of about 19,000 more dwellings. Taking into account an extension to four villages with between 500 and 1,000 inhabitants completed in March 2011, the ASTURCÓN network now provides services to 45 towns, representing approximately 9.5% of all homes in Asturias.

### Deployment & Take Up

**Technology/architecture:** GPON with 1/32 splitting

**Deployment method:**

Facade cable and ducts, using public infrastructure such as traffic light or public lighting ducts when possible.

**Size of network:**

~51,951 premises passed including 15 industrial parks

**Take-up:** 10,600 customers (end 2011).

Penetration is about 40% in the original project area of the mining valleys. Take-up is lower in the coastal villages where there are many holiday homes.

Has the Principality of Asturias succeeded in its aims? Definitely yes, says Juan Manuel Rodríguez, director general, GITPA. Public investment has eradicated the digital divide in the region, and has created a new and



attractive business model for the operators. "This new model for telecoms based around sharing infrastructure is needed in order to cover demand outside big cities," he explained. "There are real opportunities to operators to deploy new services using this business model, because they will have low investment needs, and it dramatically reduces their time to market."

The network is designed as a single infrastructure operated by GITPA, which offers wholesale services to multiple retail service providers. GITPA offers a common single point of interconnection for the entire network located near the railway infrastructure (commonly used by telecom operators in Spain to expand their network), where it offers also colocation facilities. Service providers buy Layer 2 Ethernet services between the point of interconnection and the optical networking terminal at the customer properties.



and support for customer service and fault management. Operators and GITPA interact via a web portal [www.gitpa.es](http://www.gitpa.es) which gives direct access to a range of features, such as network coverage, status request for all services, incident logs and more. Although it has taken some time to build momentum, now there are three service providers on the network, including French incumbent Orange, which launched services in June 2011.

## Business Case

**Total investment: €56.7M**

**O&M cost (2011): €656,000**

**Income (2011): €1.9M**

To make it easier for new service providers to engage with the public operator, the operator processes were designed to have a similar look and feel to Telefonica's offer of wholesale broadband services based on local loop unbundling. GITPA also developed a high-quality customer support system based on the TeleManagement Forum e-TOM standard, to provide operations systems



## End-user Services

Three operators offer services (December 2011):

**Telecable:** [www.telecable.es](http://www.telecable.es)

>40 channels RF TV, voice (POTS); and internet: 15, 70, 100 Mbps download and 1.2, 1.5Mbps up

**Adamo:** [www.adamo.es](http://www.adamo.es)

high-speed internet 100/100Mbps; and VOIP

**Orange:** [www.orange.es](http://www.orange.es)

high-speed internet 100/100Mbps; VOIP and TV package including HD channels

The primary objective – to use public funding to boost economic development – has also been achieved, says Rodríguez. The Fundación CTIC of Asturias calculates that the public investment in communications infrastructure has added €189M to the GVA (Gross Value Added) in Asturias, equivalent to 0.9% of the Asturian GVA in 2009. The availability of high-speed internet at up to 100Gbps has attracted a number of large companies to the region including *el corte ingles*.

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## Skanova's Cooperation with Municipalities Strengthens Swedish FTTH

**The broadband access arm of Sweden's TeliaSonera bolsters expertise in providing FTTH to Swedish municipalities to further national FTTH adoption**

Sweden is already halfway towards achieving its government's goal of providing 90% of all Swedish households and companies with 100 Mbit/s access by the year 2020. As a result FTTH today plays an important and growing role in the country's broadband infrastructure: Sweden takes second place in the European FTTH Ranking, and roughly 26% of homes have FTTH subscriptions.

A distinguishing feature of the Swedish broadband landscape is the widespread presence of open-access broadband access networks upon which third-party service providers can run services. A key player in providing openaccess broadband services is the former national incumbent, TeliaSonera, which in 2008 formed a subsidiary called Skanova to sell wholesale network capacity on equal terms to both its own retail arm and competing broadband operators and service providers.



TeliaSonera Skanova Access AB today provides network capacity to 160 operators in Sweden, including municipalities, which were instrumental in pushing some of the earliest Swedish developments of FTTH deployment. Because Skanova is operator neutral, it is well positioned to provide network capacity to municipalities that want to choose their own local thirdparty service providers, while benefiting from a national wholesale network.

"Municipalities have varying geographic and demographic conditions, as well as different requirements. Our broad

product portfolio and long experience of cooperating with many different types of municipalities means we can meet any needs they may have, and do so over the long term, whatever their particular circumstances may be. By working closely with municipalities, we can team up to create the broad momentum that Sweden needs to move forward and achieve the government's broadband goal by 2020, so

Sweden can continue to be one of the leading IT nations in the world," says Regina Lundgren, Head of the Product & IT Unit at Skanova.

In March 2012 Skanova strengthened its position in the local access fibre market by acquiring Svenska Stadsnät, which serves municipalities, companies and households in seven municipalities: Laholm, Svalov, Orkelljunga, Karlshamn, Gislaved, Gnosjö, Anderstorp, Smålandsstenar, Molndal and Nynäshamn.



Svenska Stadsnät's municipal customers were initially skeptical about the ability of the subsidiary of the former national incumbent to provide local services as effectively as a dedicated local access player. However, Skanova has managed to iron out any concerns by keeping Svenska Stadsnät as a separate entity with its own management structure, and by meeting with representatives of the municipalities in order to fully understand and meet their requirements.

### Deployment

#### Size of network:

- Skanova does not publish the number of homes passed by FTTH, or FTTH subscriber numbers. However, according to IDATE, roughly 26% of Swedish homes have FTTH subscriptions.
- Skanova is continuing to work with municipalities to ensure Sweden attains its goal of equipping 90% of households with 100 Mbit/s access by 2020.

The payoff for Skanova has been proof of its ability to be responsive to the individual needs of municipalities and local network owners, whether they are at the initial stages of investing in FTTH networks, or looking to expand the reach of their existing local fibre access network.



“We tailor our network offering in close dialogue with each municipality. Some municipalities would like to increase the capacity of their fibre-based network to serve households in single-family homes and apartments, while others want to upgrade and strengthen their network for companies in densely populated regions or rural areas. Skanova is a reliable and secure partner for municipalities because of our solid experience from building, operating and maintaining networks. Skanova wants to have a good dialogue with municipalities. Together with the municipalities, we build out the fibre network on a commercial basis and offer companies and households the possibility to connect to the network,” explains Skanova’s Regina Lundgren.

## General Information

### Infrastructure owner:

- TeliaSonera Skanova Access AB is an operator-neutral broadband access provider to municipalities, businesses and consumers across Sweden. The company was established in 2008 and is based in Farsta, Sweden.
- TeliaSonera Skanova Access AB operates as a subsidiary of TeliaSonera AB.

### Location:

Sweden

### Service Provider:

Skanova provides wholesale broadband access nationwide to 160 service providers, including TeliaSonera, which offers tripleplay TV services, and municipalities.

Municipalities often lack broadband network planning and architecture skills. Skanova offers advice on aspects of network build, such as how to align a planned FTTH build with existing electricity, water and telecoms infrastructure so as to make more efficient use of ducts, and reduce both civil engineering costs and disturbance to the local community. Skanova can then operate the network for other service providers and provide longterm maintenance services.

Mölnadal Municipality on the west coast of Sweden was one of the customers Skanova took on when it acquired Svenska Stadsnät AB in 2012. Mölnadal saw FTTH as essential to achieving its goal of attracting new knowledge-based businesses, and partnered with Svenska Stadsnät in



2007, before rolling out its municipal fibre network in 2009. Today, approximately 6,000 companies operate in Mölnadal, including major enterprises such as AstraZeneca, as well as smaller firms.

“Securing reliable fibre connections in the region has been vital, especially to nurture and retain a prosperous business community. Companies are very interested in establishing operations in our municipality due to our strategic geographic location, but also because of our stable and reliable digital infrastructure,” says Lars Ekberg, Head of the Economic Development Office for the Municipality of Mölnadal.

The new network means the municipality has climbed from No. 27 to No. 3 in the rankings for fibre penetration in the Västra Götaland region of Sweden.

The build-out of the fibre network has also helped the municipality improve services for residents and increase efficiency by linking up schools, health care units, and other local departments

“When we started to cooperate with Svenska Stadsnät AB in 2008, our fibre network only served various services for the municipality’s own operations. The objective of our collaboration with Svenska Stadsnät was to offer a well-developed fibre-based network for residents and companies in the municipality. We are well on our way to meeting this goal since the last build-out phase of our municipal network was inaugurated at year-end 2011,” says Göran Persson, IT Manager for the Municipality of Mölnadal.

Written in December 2013  
Photos provided by Skanova  
Contact us on [info@ftthcouncil.eu](mailto:info@ftthcouncil.eu)

# Stadsnät i Svealand

FTTH CASE STUDY

## Swedish FTTH Network Consolidation Indicates Maturing Market

The ongoing consolidation and acquisition of Sweden's municipal FTTH networks point to increasing service maturity.



Swedish municipal Fibre to the Home (FTTH) operator, Stadsnät i Svealand AB (formerly, Mälarenergi Stadsnät AB), kicked off January 2014 with the addition of three new joint shareholders in addition to Mälarenergi AB.

Based in the town of Västerås, Mälarenergi Stadsnät was one of Sweden's first regional FTTH access providers when it launched in 2000. Initially 40% owned by the company ABB and 60% owned by the local municipal utility company Mälarenergi, the FTTH provider has belonged outright to Mälarenergi since 2003.

### General Information

**City:** Västerås, population 141,000, Hallstahammar, population 15,400, Eskilstuna, population 100,000, and Arboga population 13,400

**Project name:** Stadsnät i Svealand (formerly, Mälarenergi Stadsnät)

The new shareholders are the three neighbouring municipalities of Arboga, Hallstahammar and Eskilstuna, and Stadsnät i Svealand already operates FTTH networks in the latter two cities.

The new investment structure will ensure that Stadsnät i Svealand can maintain its focus on providing fibre access to homes and businesses over which service providers, including the local municipality, run a wide range of services. And it means the FTTH supplier will be able to draw on its considerable operational experience to expand the reach of its FTTH network into the bordering municipalities.

"We're inviting neighbouring municipalities to become joint owners in order to engage them closely in FTTH services," explains Per Norrthon, CEO of Stadsnät i Svealand. "The advantage for municipalities is that we provide the network know-how, and they can use FTTH to support local services such as caring for the elderly."

Stadsnät i Svealand's move to consolidate FTTH network construction and gain greater economies of scale is part of a broader trend in Sweden. In 2012, for example, Skanova bought Svenska Stadsnät AB. Now a number of private investors are also looking to buy and consolidate small FTTH networks, says Norrthon.



"Private equity firms have started to invest in the Swedish FTTH market. It's a sign that it's getting more and more mature."

### Business Case

**Cost:** €50 million over the past 10 years

**Number of years to ROI:** 7 to 10

**Business model:** active sharing.

Mälarenergi Stadsnät owns the network in Västerås, Eskilstuna Energi & Miljö in Eskilstuna, municipalities in Hallstahammar and Arboga. Stadsnät i Svealand operates the active equipment, and offers wholesale capacity to service providers.

Investment by municipalities brings several advantages, one of which is financial, says Norrthon. Stadsnät i Svealand bases its business model on a return on investment of between 7 and 10 years, and offers municipalities a minimum 6% return on total capital investment. But once these goals are met, municipalities leave the company to invest remaining profits in building more infrastructure, rather than in paying dividends to shareholders.

## Deployment

### Size of network in Västerås, including Hallstahammar and Eskilstuna:

- 2,500 connected businesses
- 19,000 connections for public services (municipalities' administration, schools, elderly care, etc.)
- 60,000 connected apartment buildings and houses and 30,000 subscribers
- 250 WiMAX clients

**Technology/architecture:** Ethernet. Access switches are connected in loops. The links in the transport network are 1 Gbps; customer connections are nominally 100 Mbps; actual bit rate depends on service selected.

**Deployment method:** duct and fibre laid at the same time; more fibre blown in later if needed.

**Time to deploy:** deployment started in 2000 and now reaches 60% of the city of Västerås.

And crucially, the presence of municipalities on the board allows Stadsnät i Svealand "to establish itself as a local, trusted partner," says Norrthon, which helps the company to market its access services.

Stadsnät i Svealand's business model is based on homes and businesses paying a one-off fee of approximately €2,970 to connect to an open-access FTTH network, and then selling open access to commercial service providers, as well as municipalities. Typically, consumers pay service providers approximately €40 per month for services of 100 Mbps downstream. In addition, it makes approximately one tenth of its revenues from selling wholesale black fibre connections.

Once an FTTH connection is installed, customers can have access to a spectrum of local government services, as well as a wide range of TV and other offerings.

Currently, Stadsnät i Svealand's network can reach 60,000 homes, following an investment of approximately 50 million euros in building city networks. In the next few years it intends to double its reach to 120,000 homes.



Norrthon expects several factors to stimulate demand, including the fact that municipalities are increasingly using FTTH to provide social services. Stadsnät i Svealand's open-access model means the take-up of new city services will have little immediate impact on its bottom line. However, the resulting growth in data traffic across residential broadband access networks should create greater need for very high-speed broadband, says Norrthon.

Indeed, the rapid growth in data usage should strengthen the business case for FTTH across Europe, and could underpin the development of more sophisticated pricing models based on quality of service.

"One of the big changes is that there is a growing demand from mobile operators for wholesale access and for WiFi offload," says Norrthon. "Everyone is using more data, and it will finally show itself in the pricing of data services. If operators provide quality of service guarantees, then they should be paid for it. I think Europe's operators will find new business models."

## End-user Services

**Services:** 1 – 1000 Mbps access

**Service providers:** > 35



# AB Stokab

## Stockholm makes hi-tech economy and society a reality

### Council-owned AB Stokab rolls out large-scale dark fibre network across city

AB Stokab, formed in 1994 and owned by the City of Stockholm, is providing a passive fibre optic communications network to the highly knowledge-intensive Stockholm region.

#### General Information

**Location:**

City of Stockholm

**Infrastructure owner:**

AB Stokab, wholly-owned by the city of Stockholm

**Population:**

Over 850,000 people

**Service Providers:**

Over 100 operators and service suppliers are using Stokab's network to deliver their services

For several years, the service sector, including IT and other knowledge-intensive activities, has been responsible for creating the majority of new jobs in Sweden, as well as an increasing percentage of the country's export revenue. Roughly 60% of Sweden's IT employees are located within the Stockholm region and some studies claim this is the most knowledge-intensive region outside of the US.

Several Stockholm-based tech companies, such as Skype, Spotify and Transmode, have gone on to become big players in their industries. In the 2011 edition of its Cities of Opportunity study, PwC examined services in 26 large global cities. It identified Stockholm as having the best network for schools, the second best broadband quality, and the best digital economy.



Today, some 90 % of all Stockholm's households and nearly 100 % of all companies have FTTH connections with speeds of up to 1 Gigabit-per-second. Stokab is responsible for the expansion, maintenance and leasing of these connections, with the aim of realising optimal conditions for IT development in the region. The network is open to all parties, on equal terms, and Stokab rents 'dark fibre' connections to anyone who requires them. Customers are required to supply their own active equipment.

From its inception, the City Council has considered Stokab a public infrastructure company, much like a public organisation responsible for roads. The deployment of Stokab's initial network was financed by loans backed by the City of Stockholm, and it connected mainly public institutions and universities. The network began to expand rapidly as more and more private businesses started purchasing dark fibre circuits.

#### Deployment

**Penetration:**

Over 90 % of Stockholm's households subscribe to FTTH

**Time to deploy:**

1994-2012

**Stokab's orders by volume**

- 50 % service providers, communications operators and mobile broadband operators
- 10 % public entities
- 40 % remaining customer categories (media companies, B2B integrators, real estate companies)

#### MEETING THE DEMAND

From 1994 until 2000, telecom operators, large enterprises and government agencies and organisations were increasingly demanding fibre. In Stockholm, 90% of households live in multi-family properties. These households began demanding broadband access on a large scale around 2000. In 2005, market demand was still growing, with requests from large property owners. To cater for these requirements, Stokab has been consistently rolling out FTTH from 2007 to 2012. Stokab offers network termination points in building cellars. Property owners connect their own fibre network to these house nodes, and the connections run to individual apartments and other relevant locations.

## Business Case

### Total Investment:

SEK 3,000 million for the backbone network and  
SEK 1,500 million for FTTH

### Investors:

City of Stockholm owns Stokab 100 %

- No public subsidies. All funding comes from customer revenues
- Gradual deployment allowed for cash-flow generation early on

### Business Model:

PIP - Physical Infrastructure Provider

More than 100 operators and service suppliers are using Stokab's network to deliver their services. These services include everything from Internet connection to TV, telephony and specific Cloud-based services. Regardless of what kind of business model operators and service providers use, Stokab's solutions make it possible for them to reach end customers simply and cost-effectively. The large fibre network has also facilitated the rollout of mobile high-speed networks like 3G and 4G/LTE. Stockholm is now the world's only city with four competing LTE networks. For public services, such as hospitals, schools and security camera networks, leasing connections from Stokab guarantees reliable and powerful infrastructure. Stokab's wholly-owned subsidiary, S:t Erik Kommunikation AB, is responsible for administering and developing communications solutions on behalf of the city. Sweden now has over 200 municipal networks, most of them similar to the Stokab model.

### FINDING FINANCING



"The challenge here, as with all fibre projects, is realising low cost of deployment," explains Anders Broberg, Head of Communications, AB Stokab. "Another issue is obtaining agreement from all property owners. We tackled these challenges by building area-by-area, in order to achieve economies of scale, and working in a highly-structured manner."

All financing comes from our customers, and we have never used taxpayers' money. All expansion has been made possible through earnings and loans. People interested in receiving fibre weren't asked to pay a fee up front. In fact, we took quite the opposite approach. We paid every property owner a symbolic SEK 500 (just under EUR 60) to connect their property with fibre."

Analyst firm United Minds compared broadband prices in ten European cities and concluded that Stockholm's dark fibre connections were offered at the lowest price among the cities analysed. From 2006 onwards, Stokab introduced a simple, transparent pricing structure, allowing customers to anticipate prices and build business models without having to continuously rely on Stokab's sales teams. This proved very valuable to integrator and operator customers in particular.

## End-user Services

Provided by over 100 operators and service providers, services include everything from Internet connection to TV, telephony and specific Cloud-based services

The high-speed network has also made implementation of e-services very straightforward. Stockholm's infrastructure makes it easy to develop joint solutions. As almost all citizens use the Internet, the current demand for e-services is vast. Access to a robust fibre network is proving absolutely essential for the local economy. In fact, the number of jobs has actually increased during the financial crisis.



Written in May 2013  
Photos provided by AB Stokab  
and @sergiyN-Fotolia.com  
Contact us on [info@ftthcouncil.eu](mailto:info@ftthcouncil.eu)

## Shared risks and rewards in a co-investment model

*The Swiss national operator is co-investing with utilities in a national FTTH access network that will future proof its business and provide new wholesale opportunities.*



In late 2008 Swisscom decided its future lay in providing new services over FTTH. Nearly four years later, and with fibre passing 420 000 homes, the Swiss incumbent remains just as convinced that its long-term viability depends on building out fibre access networks.

“We believe that if we don’t invest in next generation networks we will be out of business because we won’t be able to remain competitive,” said Daniel Staub, head of wholesale, Swisscom.

Today Swisscom faces stiff competition from cable networks, which reach 80% of Swiss homes and can outperform a copper-based rival. “If cable operators can easily offer 50 Mbps or more over Docsis 3.0 and we offer VDSL speeds of 20 Mbps or 30 Mbps then we are clearly at a disadvantage,” said Staub.

But speed is not FTTH’s only selling point: FTTH also offers symmetric data transfers, which will underpin future cloud services. “End-users’ bandwidth requirements will grow substantially in the years to come and our current experience points to exponential, rather than linear growth. Already in mobile networks data usage is doubling every seven months and in fixed networks it is doubling every 17 months. If, as we expect, we see the development of more cloud services then we will need greater capacity and the upstream capacity of fibre, which will give us a competitive advantage over the cable operators” explained Staub.

## General Information

### Infrastructure owner:

Swisscom and/or utility companies

### Location:

Swisscom is rolling out its fibre-optic network in more than 40 cities, municipalities, and cantons. As of mid-2012 Swisscom was cooperating with partners on infrastructure build in the following 15 places: Basle, Bellinzona, Berne, Derendingen, Fribourg, Geneva, Gland, Meilen/Herrliberg, Lausanne, Lucerne, Pfyn, St. Gall, Upper Valais, Winterthur and Zurich.

Not that Swisscom will be alone in offering FTTH broadband services. The operator is co-investing in FTTH networks with utility companies in fifteen major Swiss towns and cities. Swisscom and its partners are laying four fibres per home to facilitate wholesale open access.

Swisscom initially intended to build NGA networks alone. However, utility companies, some of which are part-owned by municipalities, also wanted to invest in FTTH, either because they judged it to be a sound business investment, or because city governors viewed it as essential infrastructure. The only way to avoid the rollout of parallel fibre networks was to co-operate with utilities. “It’s a very fundamental change in culture. We are the guys who know how to build networks and we’re used to doing it alone,” said Staub.

Co-investment comes with a number of advantages: the investment risk is shared between a partner and Swisscom. In addition, the most suitable duct system can be used for the network build out.

## Deployment

### Size of network:

420 000 homes passed as of mid-2012

### Subscribers connected:

9 200 (IDATE estimates, June 2012)

### Technology/architecture

Swisscom and partners each lay four fibres to a home, which enables several operators to compete in providing point-to-point network access.



Nevertheless, even though “it’s very interesting for us to have someone who picks up 50% of the cost,” according to Staub, “it creates additional competition, even at the wholesale level.” Some utilities only offer layer 1 and layer 2 wholesale access to alternative service providers. In Lausanne, for example, the utility player and the cable operator are one and the same, which means Swisscom will face competition from a powerful integrated network and service provider.

## Business Case

### Investment:

Swisscom plans to invest CHF 2 billion in fibre-optic expansion by 2015. Where possible, Swisscom has partnered with local utility companies to reduce costs.

### Business model:

Depends on the utility or municipal business partner.

And Swisscom, which does not intend to compete on wholesale pricing with utility companies, admits it runs the risk of being under-priced by municipalities. However, Swisscom believes its ability to offer national coverage will bolster both its retail and wholesale offer.

Another issue Swisscom faced was working closely with a network partner on the provisioning of new customers. “One of the key challenges was to prepare an automated customer support and provisioning system that responds promptly to customers’ orders, regardless of whether it is Swisscom or a utility company that owns and operates the network,” said Staub.

Swisscom’s customer provisioning and support system became operational in the first half of 2012. Yet despite this and its growing FTTH footprint, Swisscom has deliberately held back from launching a major marketing campaign. As of mid-2012, Swisscom, whose VDSL networks reach 90% of the Swiss population, had a few thousand active users and a small number of FTTH-specific services, according to Staub. “We provide services at a national level. We want to have TV and internet offering for the same price nationally, but it would be a waste of resources to create a national TV campaign with only 420,000 homes passed.”

Instead Swisscom is developing local campaigns to address the local and regional dynamics. It takes between three and five years to build an FTTH network that covers a whole city the size of Lausanne, the company explained. Lausanne’s footprint (as of mid-2012) is between 30% and 35%. “It doesn’t make sense to do a city-wide mass-marketing campaign, so we are running small information events for

people living within the footprint. It’s a new dynamic for Swisscom,” said Staub.

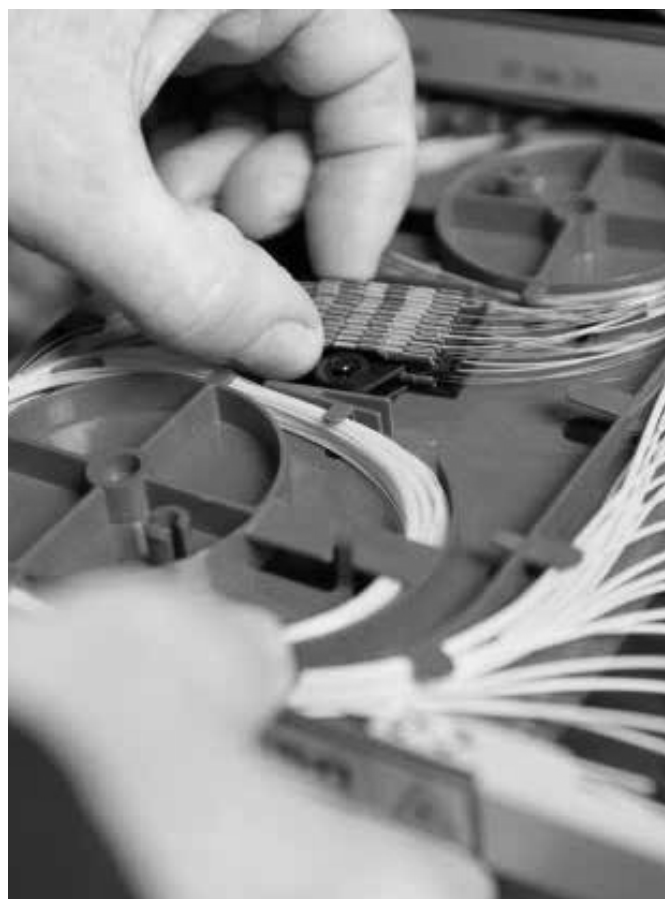
In this way, the company hopes to acquire between 40 000 and 50 000 FTTH customers by the end of 2012. In parallel the company plans to have laid FTTH to one third of Swiss households, or one million homes, by the end of 2015, and aims to provide over 100 Mbps access to 80% of Swiss households by 2020 based on a mixed access technology approach.

And Swisscom won’t stop at major towns, Staub says. “We are starting to get requests from rural areas to build FTTH; regional authorities are starting to worry about the digital divide.”

## End-user Services

Swisscom’s retail packages on its FTTH network start at CHF 89 for 5Mbps internet access, 110 TV channels and inclusive telephone calls. The high-end package costs CHF 159 for 50Mbps/TV/phone.

Swisscom is planning for a mixed technology network providing 80% of the households with bandwidth speeds of at least 100 Mbps by 2020.



Written in November 2012  
Contact us on [info@ftthcouncil.eu](mailto:info@ftthcouncil.eu)

## A Swiss region leads with an FTTH project for its 67 communities

Municipality-owned DANET Datennetzgesellschaft Oberwallis AG is planning, building, operating and maintaining a comprehensive fibre optic network which will be completed by 2025

Back in 2009, the Regional Association of Oberwallis, part of the Swiss canton Wallis, had the vision of this forward-looking FTTH project. They commissioned a study from RW Oberwallis AG (Regions- und Wirtschaftszentrum Oberwallis) to evaluate the feasibility of providing a future-proof fibre optic network for all of its communities in the region. As a result of the study and RW Oberwallis's recommendation to deploy a FTTH infrastructure, DANET Datennetzgesellschaft Oberwallis AG (DANET) was founded in November 2012. This independent company – owned by all of the communities in the region and some private investors – is responsible for planning, building, operating, and maintaining the fibre optic network, which remains in the ownership of the communities.

The 67 communities of the Oberwallis region are located on terrain ranging from 581 to 4,634 metres above sea level. Similarly, each community differs from the others in structure and financial strength. The total geographic area covers 2,621 km<sup>2</sup>. In the final stage of deployment around 40,000 fibre optic connections are expected to serve the population of roughly 80,000. The FTTH infrastructure terminates at each residential unit with four fibres strands, which is in accordance with the nationwide model recommended by the Swiss regulator BAKOM. DANET is responsible for building layer 1 of the network, which is then activated by a provider selected by the customer.



"The total cost of the project is estimated at CHF 200 million (€ 200 million). And the complete area should be covered by 2025 or earlier," explains Martin Nanzer, CEO of DANET. "We are on track with deployment and have started offering services in Gampel-Bratsch, Eyholz (Visp) and Eischoll since

the end of November 2014. DANET and Swisscom together are investing CHF 40 million (€ 40 million) in the first phase of the project. In this phase the building cooperation will reach 16,000 households and business units."

### Deployment

#### Size of network:

A total of 40,000 connections are planned for a population of roughly 80,000 inhabitants.

#### Technology/architecture:

Passive FTTH infrastructure in point-to-point topology. At this time activated by two providers: Swisscom and Valaiscom. Negotiations with other providers are in progress.

#### Third party access:

Open Access

At the beginning of the project, when it assigned RW Oberwallis AG with implementation, the regional board of Oberwallis defined the following five targets:

- 1) The fibre optic network should cover the whole region;
- 2) The network should allow for competition;
- 3) Expensive parallel investments should be avoided;
- 4) All major players of the region should be included in the project;
- 5) Financial expenditures for the communities should be minimized.

These objectives are still the most important guidelines for the project management.

### General Information

#### Infrastructure/network owner:

Passive network components: DANET Datennetzgesellschaft Oberwallis AG or Swisscom.  
Feeder generally provided by Swisscom. Drop cable and needs-oriented inhouse cabling built by DANET or Swisscom. Network activated by particular provider.

#### Location:

67 communities in the region Oberwallis (Canton Wallis), covering an area of 2,621 km<sup>2</sup> with terrains ranging from 581 to 4,634 metres above sea level.

Taking into account the Swisscom built utilization units in Glis plus the three DANET building areas of Gampel-Bratsch, Eyholz, and Eischoll, 10 % of all Oberwallis households were connected in November 2014; the remaining 64 communities to be connected gradually over next 10 years.

#### Network status:

Partially operational

## Business Case

### Investment:

Total cost is estimated at CHF 200 million (€ 200 million). State aid and public funding have not been claimed.

### Business model:

DANET plans, builds, operates, and maintains the fibre optic network. The infrastructure (four fibres into each home according to the Swiss nationwide standard) is built in cooperation with Swisscom AG and local utility companies. Swisscom and Valaiscom are providing services

To finance this project without any state aid a solid model was established. If the total cost of the project were shared amongst the population of Oberwallis, the cost for each inhabitant would have been CHF 1,000. According to targets this amount had to be minimized. As a result, the expected revenues to be generated by operating the network were estimated. For this task the provider Valaiscom AG – also fully owned by the communities – has played a significant role. Valaiscom activates the network and generates revenues through the usage of the network. However, calculations demonstrated that without a strong financial partner the communities could not realize the project by themselves. Therefore, the local utility companies agreed to build and operate the network for DANET without investing into the network, and, after comprehensive negotiations, Swisscom AG agreed to partner for investments and constructions. Swisscom has always been a reliable partner and supported the initiatives and approach in Oberwallis. It promised to participate with 50 - 60% investment in phased implementations. DANET is only building the layer 1 infrastructure, together with Swisscom; the particular provider then activates the network.



## End-user Services

### Business customers:

For business customers tailored solutions will be provided. Pricing depends on the services chosen.

### Private customers:

Portfolio of Valaiscom in the village of Glis

- All-in-One Basic 30 Mbps symmetric DL/UL € 99 (CHF 99)
- All-in-One Complete 80 Mbps symmetric DL/UL € 119 (CHF 119)
- All-in-One Supreme 200 Mbps symmetric DL/UL € 149 (CHF 149)

All pricing includes Internet access with 5 – 15 GB of cloud space, flat rate telephony into all Swiss fixed and mobile networks, HDTV including Set-Top-Box and up to 230 channels, and Mobil-TV for PC, tablet, and smartphone. New customers receive the first three months for free.

Independent of the actual development costs in centre villages and remote communities, each community is paying CHF 400 per inhabitant. This amount is split as follows: each community invested CHF 50 per inhabitant as a basic contribution to the share capital of DANET. As soon as the community steps actively into the project a fee of CHF 350 per inhabitant is due for the development costs. In addition, DANET is financing its share in the network by generating loan capital.

Written in January 2015

Photos provided by DANET Datennetzgesellschaft Oberwallis AG, Eischoll Energie AG, and Eischoll Village  
Contact us on [info@ftthcouncil.eu](mailto:info@ftthcouncil.eu)





# Bournemouth

## Bournemouth opens first and largest pure fibre network in a UK town

### CityFibre rolls out city-wide network based on unique business and usage model

In the seaside town of Bournemouth on the United Kingdom's south coast, 21,000 homes are currently passed by a state-of-the-art FTTH network that will eventually span the entire city.

CityFibre, the UK's leading independent provider of bespoke fibre optic network solutions, owns and operates this open-access FTTH network, the largest in the UK. The PON network was originally constructed in 2009 by a company called FibreCity, but the company folded midway through its construction. The network was acquired by CityFibre in January 2011 and after considerable investment and engineering works, it is now active and supporting market-leading gigabit services to homes and businesses. Its first service provider, Gigler, launched gigabit-for-all services to consumers in early October 2012.

In advance of the original roll-out, back in 2009, Bournemouth residents were offered a free fibre connection to their home if they pre-registered. A city-wide campaign led to more than 46,800 sign-ups, representing 53% penetration. The high response demonstrated considerable demand from consumers - even though no well-known ISPs had committed to offering services at the time.

The use of micro-trenching actually helped raise awareness and stimulate interest at a local level, driving demand and further pre-registrations for connection of homes to the network.

#### ACTIVE TRIALS

"To ensure the network in Bournemouth was ready to support active services, 100 trial customers were provided with free 100Mbps symmetrical connections," says Greg Mesch, CEO of CityFibre. "That's more than 10x faster than the UK average download speeds and at least 40x the UK's average upload speeds. A handful of customers were chosen to trial the 1 Gbps service. Trials lasted for over 3 months and by the end of that period, over 95% of trial customers said they would recommend the service to a friend."

Key benefits highlighted by the trial users - besides the speeds - were the reliability, ultra-low latency (less than 5ms) which is great for gaming, the ease of uploading content and how it made online backup a practical solution for the first time. Almost all trial users noted that the network supported multiple simultaneously connected devices with no drop in quality.

### General Information

#### Infrastructure owner:

CityFibre owns and operates the network

#### Location:

The town of Bournemouth, with a population of about 170,000 (80,000 homes)

#### Network status:

Operational

#### MINIMAL DISTURBANCE

The network was built using a combination of traditional civil construction techniques for the core network and micro-trenching for the distribution element. Wherever possible, micro-trenching helped maximise the roll-out speed, whilst minimising disruption to the pavements. At full operational capacity, up to 4500 homes can be passed each month.

### Deployment

#### Size of network:

21,000 homes passed. Over 25% of all homes. (Oct 2012).

#### Technology/architecture:

PON network

#### Deployment method:

combination of traditional civil construction techniques for the core network and micro-trenching for the distribution element

#### Time to deploy:

Initial 2009 deployment ended soon after. Started again in 2011 with CityFibre providing over 18 months of engineering work to complete roll-out of first 25% of city's 80,000 homes

The Gigler campaign launched with targeted door-to-door marketing campaign. Over 50% expressed interest and 10% signed up

## GIGLER LAUNCH

“To further prove the demand for pure fibre services and to experiment with gigabit connectivity to the home, CityFibre launched Gigler, the first service provider on the network, on October 4, 2012,” explains Greg Mesch. “By providing a gigabit to the home, broadband effectively opens up a fairer pricing structure based on usage rather than speed. That way, everyone is entitled to the same superfast gigabit speed, every time they use the Internet, regardless of their budget.”



“During successful customer trials, it came as no surprise that people not only enjoyed the incredible user experience due to the speeds, which dwarf any other residential services available, but also that their online behaviour patterns changed in step with the more advanced technology,” says Greg

Mesch. “They uploaded more files and content, as well as shifting more of their overall TV programme and film viewing online.”

## Business Case

### Investment:

In excess of £12 million

### Investors:

A consortium of the founders and professional early-stage investors in telecoms companies alongside experienced entrepreneurs in the telecom infrastructure space

### Business model:

Open access wholesale model

A subscription to Gigler’s market leading service is available for only £25/month with no line-rental. This represents a lower ‘total cost of ownership’ than many competitive products running at a fraction of Gigler’s speed.

Despite being a new brand on a small-footprint and with correspondingly limited marketing channel opportunities, initial sign up volumes are strong and demonstrate market demand. There has been a positive reception to new fibre services and early indications are that Gigler may be able to grow penetration to over 10% in the coming year.

## End-user Services

Gigler launched gigabit-for-all services to consumers in early October 2012.

There are three packages to choose from, starting from £25 per month for 80GB Usage, £30 for 250GB, and £50 for truly unlimited use.



Written in January 2013  
Photos provided by CityFibre  
Contact us on [info@ftthcouncil.eu](mailto:info@ftthcouncil.eu)

# Hyperoptic

## London apartment blocks get gigabit speeds

New operator spies a missed broadband opportunity in the heart of the UK's capital city



Hyperoptic is bringing gigabit broadband to underserved homes in London – speeds 100 times faster than the national average. The company works directly with building owners and management companies to install optical fibre into large property developments, places that have generally been overlooked by other operators. In the kinds of large apartment blocks that Hyperoptic sees as its prime target, most residents don't have access to cable networks, and typically their phone lines are delivered by exchange-only lines, so they don't have access to the faster fibre-to-the-cabinet (FTTC) solutions either.

### General Information

**Company:**

Hyperoptic Ltd.

**Founders:**

Dana Pressman Tobak and Boris Ivanovic

**Location:**

London

"What's happened, which is completely understandable, is that UK incumbent Openreach has focused on bringing FTTC to as much of the country as fast as they can, which is an absolutely valid goal for them," said Dana Tobak, founder and Managing Director of Hyperoptic. "But what it's done is that it's left these prime properties without proper broadband. We see a market opportunity, we see the customer demand and we can service that demand with a market-leading product, so it's a perfect opportunity for us."

Launched in 2011, the Hyperoptic story really begins much earlier. It is the second business venture for founders Dana Tobak and Boris Ivanovic. Their previous enterprise was Be Unlimited, which they started in 2004 and sold to O2 in 2006. Prior to that, Ivanovic had been running a company

in Sweden called Bostream, which was sold to its largest competitor. "What's interesting about that first business is that they were essentially doing fibre direct into buildings," said Tobak. "At the time that Boris sold that company, we happened to be chatting, and he said... the UK is so far behind in broadband infrastructure and speeds that there's a great opportunity to repeat what I've done in Sweden here in the UK, and I think you'd be the perfect person to run it. Essentially that was the foundation of Be."

### Network

**Size of network:**

20,000 homes in signed-up buildings, but this number is increasing all the time (figures from March 2013). About two-thirds of signed-up buildings are live.

**Technology/architecture:**

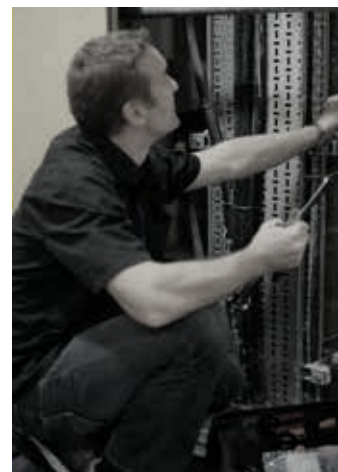
Fibre to the building (FTTB)

**Deployment method:**

Point-to-point fibre to individual buildings; optical fibre or Cat5e Ethernet cables inside buildings.

The partners had intended to do a fibre product through Be Unlimited, but they found the market wasn't ready for such an offering, nor were the costs of fibre infrastructure considered affordable. "The cost of putting in fibre lines has fallen about 50% since we started Be," said Tobak. "What we've got now is a change in mentality around the importance of speed, as well as a cost infrastructure coming down that allows us to put together a business model that works for Hyperoptic."

Hyperoptic's approach is fibre to the building (FTTB), concentrating on large residential and commercial developments of 80 units and above. An optical fibre is laid directly to the building and then broadband is distributed to different residences or offices using Category 5e (Cat5e) Ethernet cable or more optical cable inside the building. (Cat5e Ethernet cabling is specified to carry gigabit speeds for distances up to 100m, making it suitable for in-building networks, but not for the access network.) Hyperoptic prefers to run Cat5e cables inside the building, because installation is easier and it makes the footprint within the home smaller. In a customer's flat there is just an Ethernet face plate, similar





to a phone socket, so if the resident wasn't connected, they wouldn't even notice it was there.

Hyperoptic has two different models, as Tobak explains. "We do have circumstances where we sell into the property managers and they get agreement from the residents that everyone will take the service and we do a discounted group deal, which is great for both the residents and for us! But most of the time, we do have to do a wayleave permission with the freeholder, and then we contract to individual residents as they would with a normal broadband provider." Another idea the company is currently exploring with developers is providing the infrastructure and including broadband in the service charges in the same way that electricity or gas is already included.

## Business Case

### Investment:

Start-up funding was provided by the founders. In May 2013, Hyperoptic secured equity investment of £50 million led by Quantum Strategic Partners Ltd., a private investment vehicle managed by Soros Fund Management.

### Business model:

Vertically integrated

### Wholesale services:

Not offered

As broadband connectivity starts to affect occupancy rates and directly inform a tenant's or prospective homeowner's decision to purchase, it is increasingly having an effect on the property sector, says Hyperoptic. According to a survey of 1,500 homebuyers, carried out by comparison website Broadbandchoices.co.uk and property consultancy Henry Pryor, UK homebuyers would be prepared to pay 5% more for a property serviced by ultra-fast broadband. Hyperoptic's progress confirms this trend. In October 2012, about 13 months after it launched, the company announced that it had signed up more than 30 property developments to take its fibre-based services, covering around 10,000 homes. By March 2013, that number was closer to 20,000 and is increasing all the time, says Tobak.

One factor that's been vital to the successful launch of the business is customer service. As a vertically integrated company that owns and operates the fibre network, that means taking good care of the both end users and the building

owners. "From the end customer's perspective, we offer a very personal service," Tobak said. "They know the names of the customer service reps, and each building gets its own customer service rep." Hyperoptic also works closely with



the freeholders of the building so that it understands what their drivers are and can meet with whatever design rules they have for their building. "We want to do what's right for the building," said Tobak. "We're not married to a particular way... we work with the building owners to make sure that it's something that they look at as a positive investment into their building. And that's really the trick of it."

In July 2013, Hyperoptic was named as 'Best Superfast Broadband' provider at the 2013 Internet Services Providers' Association (ISPA) Awards, as well as being a finalist in three other categories, including 'Best Consumer Fixed Broadband', 'Best Consumer Customer Service' and the 'Customer Choice' award. The 'Best Superfast Broadband' category of this UK industry award recognises the ISP providing the best service offering at 30 Mbps and above.

## End-user Services

### Hyperoptic offers three product tiers:

Hyper-lite (20 Mbps), Hyper-active (100 Mbps symmetric) and Hyper-sonic (1 Gbps symmetric), with the following monthly pricing:

### Broadband+phone packages:

Hyper-lite: £12.50, Hyper-active: £25.00, Hyper-sonic: £50.00; plus an additional £12.50 for line rental

### Broadband-only packages:

Hyper-lite: £22.50, Hyper-active: £35.00, and Hyper-sonic: £60.00

Business users can request leased line replacement services

Where does Hyperoptic see itself in five years' time? "We'll still be urban based," said Tobak. "Right now we focus on blocks of 80 and above. That'll come down over time, so then we can go into the more suburban areas. We're not aiming to be a company that focuses on rural broadband, I think it's a great cause and I'm happy people are taking that up, but that's not what we're trying to do. We're trying to focus on the cities, on the places where we can bring a real fibre broadband product at a great price to our end customers." She says Hyperoptic is currently looking at a city outside of London that would become the operator's second city. The operator expects to start deployment in ten new cities by the end of the year, and expand its coverage to 500,000 homes in the next five years.

Written in August 2013

Photos courtesy of Hyperoptic  
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# JT (Jersey Telecom)

FTTH CASE STUDY

## Channel Island operator rolls out island-wide ultrafast fibre

*The island's incumbent operator is aiming for 1Gbps to all homes and businesses by 2016.*

The Island of Jersey lies 100 miles south of Great Britain and 14 miles north west of France. It has a population of around 100 000 and boasts the world's sixth highest per capita GDP. JT (formerly Jersey Telecom) is now well advanced in its plan to offer 1 Gbps symmetrical connectivity to all of its businesses and homes, using advanced fibre infrastructure plus open access Wi-Fi and 3G mobile networks at all points.

### General Information

**Location:**

Jersey, population of ~100 000 (42 000 homes).

**Infrastructure owner:**

JT owns and operates the network, and provides both wholesale and retail services.

**Network status:**

Operational. Trial period ended in March 2012.

**Network/infrastructure owner:**

Community of Sasbachwalden

**Network status:** Operational

Jersey is also home to one of the world's major international finance centres, with 45 of the world's top banks and over 33 000 registered companies on the island. Over £187 billion is deposited in the island at any one time. The island's finance industry has been using fibre connectivity for over 20 years using private circuits from JT, but today's businesses large and small demand 24/7 connectivity in order to remain competitive.

### Business Case

**Investment:**

Publicly known to be £41.5 million: JT's shareholder the States of Jersey invested £19m (£10 million loan and £9 million reduced dividend expectation for 3 years), and JT has invested £22.5m.

**Business model:**

JT is a fully integrated operator that builds and operates the network and also provides services include wholesale services to competitors of JT Retail.

"We are very proud to be introducing one of the first ubiquitous networks," said Graeme Millar, CEO of JT. "Being credited in the FTTH Council Europe's recent independent global gigabit report underpins our efforts and highlights that Jersey is now one of the most connected places in the world. Being recognised as one of the most digitally



advanced jurisdictions provides an excellent profile raising opportunity for the island."

"The high number of 100 Mbps and 1 Gbps customers further demonstrates there is real demand in the island for superfast fibre broadband services and we're delighted that the Jersey community is showing such an interest in getting connected to the fibre network. The fibre trial was the first phase of our three-year programme and enabled us to gain valuable learnings ahead of our island-wide roll out. With this completed, we are now rolling out fibre on an area-by-area basis, with the aim of establishing a point-to-point network by 2016, and along the way customers have a choice of services from 2 Mbps to 1 Gbps."

Removing copper cables altogether will put Jersey in a unique position as the first European jurisdiction to boast an "all fibre" network. JT had the advantage of using the island's existing extensive duct network, to create a ubiquitous fibre network. The amount of civil works remained very limited and there were not many infrastructure challenges. This helped make the switch from copper to fibre reasonably straightforward and financially viable. Gaining access to some of the ducts, which had not been accessed for many years, presented some minor challenges, but overall disruption to the island's 42 000 households has been minimal.



## Deployment

### Size of network:

17 270 homes passed. That's 41% of all homes.  
1 000 subscribers (Sept 2012)

### Technology/architecture:

Point-to-point fiber to every home in Jersey

### Time to deploy:

Publicly announced as five-year programme with 2016 end date. Accelerated business case reduces it to 3.5 years ending Dec. 2014. Network trial ran from December 2011 to end March 2012.

JT has made it clear that everyone on the island will be offered unlimited access, not only business hubs. The network will offer great benefits for businesses and social inclusion to every household and institution, and take-up rates so far have been very high.



In September 2012, Jersey passed the significant milestone of 1 000 homes connected to its new fibre network. This figure exceeded expectations and shows there is real demand among islanders. Lee Monamy, the first customer to sign up for a gigabit connection, said: "Having fast internet access has always been important in running my IT business from home and I was one of the first customers to get a residential ADSL line twelve years ago, so I'm absolutely

## End-user Services

### Consumer and business services:

A this time, standard voice and Internet access products range from 2Mb/s (for £17.99) to 1 Gb/s (at £59.99) and including a 100 Mb/s offer (at £44.99).

JT Lab is a test bed for ultrafast broadband products and services from technology, media and telecom businesses.

delighted to be the first to experience gigabit broadband speeds as well. JT is certainly putting us on par with the Scandinavian countries."

The island is currently also being promoted as a unique test bed, known as JT Lab, for ultrafast broadband products and services from technology, media and telecom companies. JT Lab offers real-time user feedback from consumers and businesses, as well as access to highly skilled technical, engineering and project management support resources. Nasdaq-quoted Chinese Internet television company UTStarcom has already signed up, and JT recently signed a second contract with Radware, also a NASDAQ-quoted company which specialises in network security.

The network will secure new opportunities for Jersey, local businesses and anyone looking to invest in the development of the island's digital economy. Treasury Minister Senator Philip Ozouf has said that superfast broadband supports government plans for economic recovery. The plan also support the States of Jersey's economic diversification and growth strategy, in particular its "Digital Jersey" programme, introduced to drive forward the island's digital economy.

Written in September 2012  
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# KC Lightstream

## FTTH take-up rate exceeds 20% in less than 12 months

KC (formerly, Kingston Communications) has an unusual history as the last municipal-owned telephone company in the UK. The 150,000 homes and business that it serves in Hull and the East Riding of Yorkshire are the only ones in the country not covered by the national incumbent BT. Now KC has taken a step that will once again distinguish it from other operators: rolling out a superfast broadband network based mainly on fibre-to-the-homes.

The company had been preparing for the change for a number of years, according to Sean Royce, commercial and finance director at KC. "We've been upgrading our networks to get ready for superfast broadband and cope with this increase in volume of traffic that everyone's seeing," he said. "We started upgrading our core network and now we have a new network across the whole East Yorkshire area that we serve. And we've done a number of other things around caching and content so we can serve data up to our customers more quickly and easily."

### General Information

#### Infrastructure owner:

KC, part of KCOM Group (a public company since 1999)

#### Location:

Hull and the East Riding of Yorkshire

#### Network status:

Operational



In 2011, KC turned its full attention to FTTH. "For a number of reasons, we think we're in a good position to deliver FTTH to the majority of properties that we serve," said Royce. Although the cost of deploying FTTH was a consideration, KC says its duct and pole network is in good condition, meaning fewer digs and lower costs for civil works than might be expected elsewhere. In some locations the operator can reduce expense by using

overhead fibre connections and pole-mounted splitters, and is always looking for other ways to keep costs down.

"We've got to be really quite creative in terms of how we deploy the network, but if we have eyes and ears on the ground, then we can seize those opportunities," he adds. "We've learned quite a lot from our initial deployment and we'll use that going forward. Rather than following a cookie cutter manual, we need to be responsive. Because we're a local business, with local staff and good knowledge of individual streets, we can use this to our advantage. If there's an issue down a particular street, our planners can be on site to deploy an alternative solution the same day."

Ultimately, the decision to deploy FTTH is about long-term value for money. "When we looked at the options, we could deploy FTTC (fibre-to-the-cabinet) with all its limitations, notably degradation of speed beyond the cabinet, or we could go FTTH from day one," said Royce. "We think that the investment in FTTH will be future proof." The operator, which is funding the roll out entirely from its own resources with no government or European subsidies, says it wants to put something in place that will "last a generation."

### Network

#### Size of network:

15,000 homes passed end 2012. A further 30,000 connections planned by 2015.

#### Subscribers:

>20% among residential customers and >30% for business users.

#### Technology/architecture:

GPON

#### Deployment method:

Underground ducts and overhead cables where available or possible.

In the first phase, KC rolled out superfast broadband to 15,000 homes by the end of 2012. About 80% of the deployment is FTTH with the remaining properties receiving FTTC or basement (FTTB). Having achieved its target, the operator now plans to continue the FTTH roll out to a further 30,000 homes by 2015, taking the total area covered to about 30% of its network footprint.



In January 2012, KC launched its “Lightstream” range of superfast broadband services, and the response has been very encouraging. To date, more than 20% of consumers and more than 30% of business users have signed up for FTTH services in the areas where it is available, the company says. KC believes that these take-up figures are significantly higher than those reported by other superfast broadband operators in the UK.

## Business Case

### Investment:

“multimillion pound investment” funded completely by the operator.

No public subsidies.

### Business model:

vertically integrated

### Wholesale services:

KC is subject to the same obligations of network access as BT

The operator feels that the decision to go for FTTH has been validated. “We feel FTTH is a more compelling proposition to customers than FTTC and this has been borne out by our experience from the roll-out to the first 15,000 properties – take up in areas where we’ve deployed FTTH is twice that of FTTC areas as a proportion of properties passed,” said Royce.



The marketing approach has been a significant factor in this early success, according to Royce. Marketing is targeted on selected areas where deployment is about to begin. In the first stage customers get a door drop to say that fibre is coming to their area; in the second wave, they receive a letter; and in the third a phone call. “It is more cost effective for us to focus our resources on a few streets at a time,” he explained. “We can go back to an

area, but customers that don’t sign up during the first wave might have to wait a little longer to get connected, maybe a few weeks. We really want customers to sign up while we’re focused on their area.”



Being able to deliver a customer experience that lives up to expectations has also been important. Customers don’t really understand the “up to” speeds; so they get disgruntled when they buy “up to” 24 Mbps and only get half of that. FTTC faces the same challenges as standard ADSL, but with FTTH an operator can deliver the speeds as advertised. KC says it needed to do some education around wireless routers, which can drop the speed by as much as 20%. “FTTH is engineer installed, so we have the advantage of an engineer on site. The engineer does a speed test with the customer and can show how the speed is reduced by wireless. Although the installation process does take longer, the customer has the benefit of being able to ask questions.”

Poplars Way in Beverley, a market town in the East Riding of Yorkshire, was recently identified in a survey as one of the top ten streets for broadband in the UK. Residents of Poplars Way enjoy average download speeds of 64.28 Mbps, according to speed tests carried out on the price comparison website uSwitch. “On that street 45 households out of 82 have signed up for our services,” said Royce. “It’s a reflection on the approach that we’ve taken.”

## End-user Services

Sold under the brand name “Lightstream”: options from £25/month for 45Mbps broadband-only to £99/month for 350 Mbps broadband. Packages available including home phone and mobile calls.

For an additional £12 per month (plus a £30 setup fee) subscribers can get KC’s own version of the YouView IPTV service. This fee includes 500GB YouView box (worth £299) and free home installation.

Written in January 2013  
Photos provided by KC  
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## FTTH Empowers Scottish Housing Cooperation

The installation of FTTH on greenfield sites gave Scotland's West Whitlawburn Housing Cooperative control over deployment, services and cost, and ensured a wide take up of high-speed broadband among its tenants.

When Scotland's West Whitlawburn Housing Cooperative (WWHC) built 100 new homes on the outskirts of Glasgow between 2007 and 2009 it chose FTTH as the communications infrastructure for its greenfield site.

By laying and managing its own network, WWHC set out to offer tenants triple-play communications services at lower rates than those of national communications service providers, according to Paul Farrell, director of West Whitlawburn Housing Cooperative, which provides affordable accommodation to lower-income families on the edge of Glasgow.

Funding for the new estate came from both the Scottish government and loans to the WWHC from the Co-operative Bank.

"The scale of the housing development was huge; and we had no existing infrastructure such as water or telecoms. Laying fibre added around 2% to the total cost; it was not significant," says Mr Farrell, adding that "the highest building is two-storey, so technically it wasn't too difficult."

WWHC remains the sole telecoms infrastructure provider on the site and in 2009 it set up a legally independent consumer cooperative, called Whitcomm, to provide and manage the FTTH access and triple-play service. Whitcomm also sets a monthly tariff based on the services tenants choose to use.

The estate's tenants have the opportunity to be members of Whitcomm and therefore decide both pricing and service evolution. In April 2012, for example, the cooperative upgraded broadband speed to 50Mbps.

### General Information

**Location:**

Cambuslang on the outskirts of Glasgow

**Type of project:**

Greenfield FTTH/GPON

**Partners:**

West Whitlawburn Housing Cooperative

**Population:**

lower-income families

**Network status:**

Operational

### Business Case

**Investment:**

Financed by WWHC and the Scottish government

**Network owner:**

(WWHC) owns and operates the open-access network.

Since it was starting from scratch WWHC was able to lay ducts for its GPON fibre network as part of its overall construction project. This meant that equipping the 100 dwellings with FTTH added little to the total 13.5 million GBP cost of building the 100 dwellings.

Whitcomm sets pricing and does not seek a return on investment in its FTTH infrastructure. "Whitcomm's capital position is neutral. We need to watch our fees," says Mr Farrell. For line rental and fibre broadband, up to and often exceeding 50 Mbps, Whitcomm charges £24.70 per calendar month. For both broadband and telephone service customers pay £30.69, which includes anytime calls to UK landlines.





Nevertheless, WWHC calculated that Whitcomm needs to attain a 50% penetration rate in order to be viable – a threshold that it has surpassed.

## Deployment

### Size of network:

100 homes connected – 78 subscribers

### Technology/architecture:

GPON

The cooperative, which manages first- and second-line support of the network itself, provided a triple-play service. But like many small high-speed broadband service providers, Whitcomm discovered that content provisioning would be its biggest challenge.

“We learnt a harsh lesson with content,” says Farrell. “Open access became complicated with TV. A number of people said they wanted Sky, and that Freeview was not enough. Then some wanted Sky and didn’t want Internet access.”

The cooperative now offers telephony and Internet access only. The FTTH network also enables the cooperative to provide home help alarms and run a CCTV security service.

Today, fully 78% of the 100 homes on the greenfield site have subscribed to FTTH. A further 20% have opted to do without a landline for phone calls and rely solely on mobile.



This compares favourably with an overall Internet adoption rate of 39% in those dwellings managed by WWHC that do not have FTTH.

WWHC, which houses many families with children and relatively few elderly people on the new site, has found that tenants use the FTTH service in particular for gaming, as well as online banking, video streaming services like BBC iPlayer, and helping with children’s homework.

FTTH may not be the primary reason tenants choose to live in Cambuslang, but three years after embarking on the FTTH project, WWHC believes that high-speed broadband infrastructure has added value to the service it provides, and helped overcome digital exclusion.

## End-user Services

50 Mbps for £24.70/month for line rental and fibre broadband. £30.69/month for both broadband and telephone service.



Written in January 2013 (v.2)  
Photos provided by WWHC  
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