

# European FTTH : Progress Update

**Tadhg Leonard**  
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**Mr. Yosuke Yamazaki**, Session Chairman:

Our second speaker is Mr. Tadhg Leonard. He joined Corning in 1999. He holds separate degrees in Telecommunications Engineering and Commerce from University College Cork. He is also a member of the Board of Directors of the Fiber-To-The-Home (FTTH) Council Europe. He will give us his view on the European FTTH market. Please welcome Mr. Leonard.

**Mr. Tadhg Leonard:**

In my talk I will give you some perspectives on where the Council believes FTTH is and where it is heading over the next few years. I will update you on the key drivers, give you some idea about connections and homes passed, then I will give you some forward looking view from the Council, as to where we think FTTH is heading in Europe.

My agenda is:

- Introduction to FTTH Council Europe
- A review of FTTH market drivers
- Status of FTTH in Europe 2007
- Closing remarks

## FTTH Council Europe

- Non-profit organization
- Founded 2004
- Original Mission: To accelerate FTTH deployment by education and promotion in order to enhance Quality of life in Europe
- Manufacturers, Construction & Engineering Companies, NPO, Academia
- 73 members

Before I start it is obligatory for us as FTTH Council Members to give you some idea as to who we are. So, a few notes on the FTTH Council itself. We are a supplier-led group of companies whose goal it is to promote FTTH investments in Europe. We are part of a worldwide effort with sister organizations in Asia and North America. Today, we only have supply member companies. We do not have any operators as members. We are reconsidering that point right now. We have 73 members, as you can see in the following list: 3M Telecommunications - Acome - ADC KRONE - AFL Europe - Agilent Technologies - Alcatel-Lucent - Allied Telesyn - BAM Infratechnik - Bechtel - BKtel Communications - Broadlight - Catway Lan System – Channel - Cisco Systems - Comptoir des Signaux - Corning - Dantex Plastrør - Dätwyler Cables - Ditch Witch/The Charles Machine Works - DKT - Draka Comteq - Duraline - ECI Telecom - EMC Electronic Media Communication - Emtelle - Ericsson - Exfo Europe - Fibox Oy - Fraunhofer Institut - Freescale Semiconductor - Genexis - Gerald Glaise - GM Plast - GNS - Huber+Suhner - Ignis Photonyx - IMC Fachhochschule Krems - Intel - JDSU - j-Fiber - Kabel-X - Kathrein-Werke - LEONI NBG Fiber Optics - Mitsubishi Electric - Motorola - Mulder-Hardenberg - NetAdmin Systems - Nexans - OFS - Optral - PacketFront - Plumettaz - Preformed Line Products - Prysmian - RDM - Senko - Nokia Siemens – Silec Cable - Sterlite Optical Technologies - Teleste - Tilgin - Triax - Twentsche Kabelfabriek - Tyco Electronics - Uponor/Radius - Volker Wessels Telecom - Wavin - World Wide Packets - ZTE Corporation

## FTTH Definition

If we say FTTH, we mean the following..

- > FTTH : where optical fiber connects from Operators switching equipment to at least the boundary of the home living space
- > FTTB : where optical fiber terminates within the boundary of the building and the last drop may be other than optical fiber
- > All other connections based on FTTC/N are excluded

Now I have to mention some definitions. It is very important, when you look at numbers in relation to FTTH, that you understand precisely the definitions we are using. The 3 FTTH organizations in Europe, Asia and North America last year combined the definitions of what we mean by FTTH. So, when you look at numbers coming from any of these organizations, here is what we mean.

Any connections, that are truly FTTH, are connected to end user premises or Fiber-To-The-Building (FTTB), which may not have a final connection based on fiber, we actually include in our calculations. But we do exclude any Fiber-To-The-Cabinet (FTTC) or Fiber-To-The-Node connections. When you look at the connections and homes passed, numbers I will give you shortly, just bear this in mind.

## Why FTTH deployment

- Next Generation Broadband is the foundation (and driver) of the knowledge economy, the next industrial revolution.
- We believe that a Fiber-to-The-Home infrastructure is critical to the long term competitiveness of Europe.
- Europe must act now to make it happen!

Why are we organized to promote FTTH? As we are a set of supply companies there is a fairly obvious reason. But there is a wider issue here, which is important. Many of our companies are based in Europe. FTTH and broadband has the power to change the way economies, countries and companies compete. There is a clear danger if Europe does not invest in this capability or put the various conditions in place to allow this investment to happen, there is a definite risk that Europe as an economy will suffer. We are entering into a new area of competition, for knowledge based networks and economies may have an advantage. This is an important dimension to bear in mind that this investment happens in Europe.

When the Council was formed, our initial objective and mission as a council was to educate and promote and tell people, what FTTH actually was. To a large extent the Board now believes that this objective has been pretty much fulfilled. We think that the environment for FTTH in general has improved significantly in Europe. With that in mind the Council has reconsidered its objectives and mission and came up with a much more proactive view, as to what we need to do now.

“Ensure that all network investors choose FTTH, resulting in a tenfold increase of new connections in the coming 3-5 years”.

This goal would suggest that we would like to see 2 to 3 million FTTH connections per year in the next 3 to 5 years in Europe. Right now in 2006 Europe connected about 300,000 homes.

## High bandwidth applications

- Triple play-offerings – as soon as customers know triple play, they want more...
  - > multiple TV-streams
  - > HDTV
  - > other interactive services
- Personal services
  - > eHealth, eMedicine etc.
- Working and learning
  - > teleworking
  - > e-learning
- Business-services
  - > IT-Outsourcing
  - > virtual business-networks



Let me go on to describe the number of drivers which will give you some indication why FTTH may or may not happen. I will go through 4 areas:

- Demand for high bandwidth applications
- Cost to deploy FTTH
- Competitive intensity within each country
- Regulatory framework

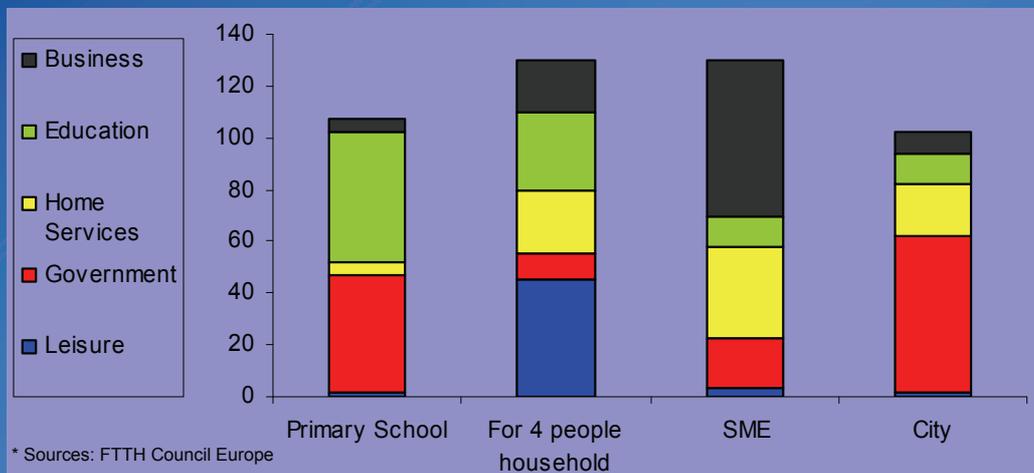
The first thing to bear in mind is, when you look at Europe, that FTTH deployment is not uniform at all. Certain countries are very advanced and others are very far behind. There are various reasons why that is the case.

There is a large range of applications using high bandwidth, ranging from residential home user entertainment services right up to the most complex business and life-enhancing services, like e-medicine.

## High bandwidth applications

Average use BW per type (Mbps)

Bandwidth expectations increase!

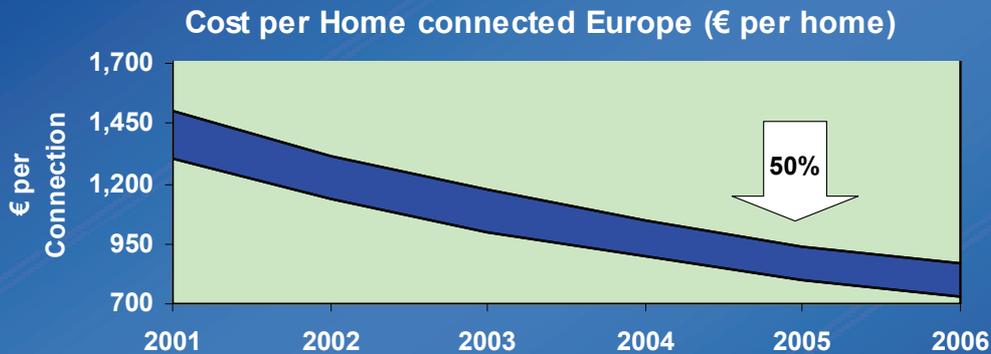


People ask us frequently what are the services that people would need that actually justify a FTTH network and 100 Mbit/s capability. The typical answer is: 100 Mbit/s and then a series of high-definition services and internet services which miraculously equal a 100 Mbit/s.

This approach has discredited to a large extent the debate. The Council believes that these numbers actually make sense. The true connectivity that people actually need is around 100 Mbit/s.

There are many other stakeholders and many other value opportunities, other than the typical models of telephony, data and video-on-demand. If you look at many of the networks in Europe, what you will see is a lot of community kind of value being delivered and government itself is a major driver and can achieve major savings by using FTTH enabled capability. On this slide we try to assess on a bottom-up basis what those other drivers and stakeholders could really use in terms of delivering services to end users. Government (red colour) can actually achieve quite a number of their objectives with a fiber-optic network available. The Council will in the next months draft a major study which we will release in February 2008 in which we will assess for each stakeholder what type of services they want to deliver and what type of capability they need to deliver it.

## Cost to deploy

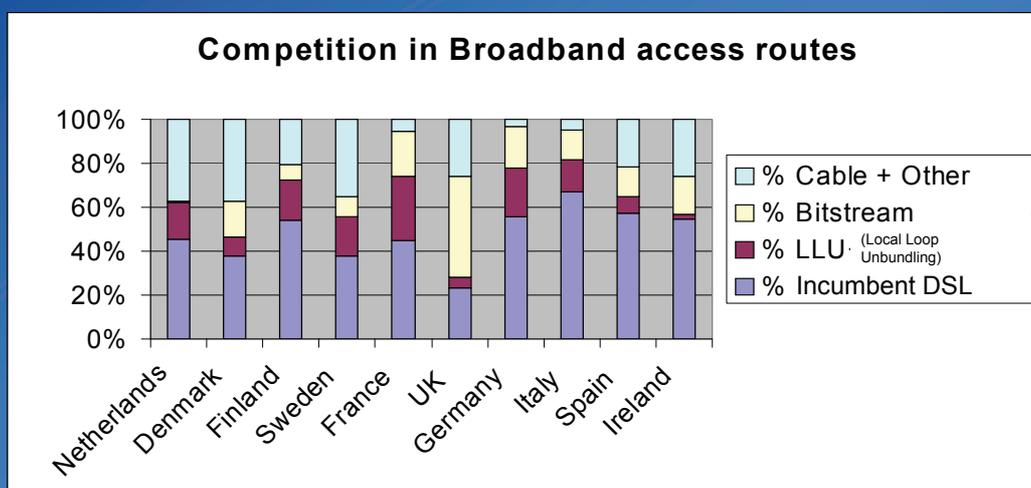


- Deployment cost of Network Infrastructure is reducing rapidly
- Close to 50% in past 5 years
- Passive and active Components, Installation – excludes civil works

Cost to deploy is a major issue. The cost that I will show you here exclude the major cost component which is the cost for civil works.

The business case for deploying FTTH is still challenging, to say the very least. The good news here is when looking at active and passive costs alone, excluding the civil component, has in general dropped by about 50% in Europe from 2001 to 2005. The blue band is meant to represent different kinds of combinations of passive and active technology. The major takeaway of this slide is that the costs of deploying FTTH is dropping and that is good news.

## The competitive landscape varies considerably between countries



Source: ECTA Broadband Scorecard, 2006

The FTTH deployment differs dramatically between countries. One of the reasons that is the case is that the level of competition and therefore the incentives and drivers to deploy something varies significantly across countries.

Let us look at the top line (light blue) which represents the availability of CableTV and the Local Loop Unbundling (purple). The presence of those two suggests a high degree of facilities based competition. It is usually a sign how competitive a market is. So far it has given a good indication in terms how likely a country is to deploy FTTH.

## Regulatory Framework

- Regulation vs. Public policy
- A stable and predictable regulatory and public policy environment is key to enabling FTTH investment
- The current Regulatory Framework is being reviewed – to conclude in October
- We are pleased to see that Next Generation Access is a major component of the Review
- The Council has developed a strong pro-investment position

Competition is one issue. Regulation and public policy tend to be the second big issue, that differs between countries. First I have to mention the difference between regulation and public policy. Regulation is concerned with implementing the various rules to promote, protect and enhance competition, while public policy deals primarily with government intervention to enable investment to happen, where a competitive market would unlikely invest. Public policy would be for example in rural areas where a competitive carrier may have no business case to invest. The use of public money to build such a network would come under public policy initiatives.

It is very important that there is real clarity in terms of regulation and public policy. This is an essential part of the environment for FTTH. Both are currently being reviewed, the regulatory framework being the more significant one. This will be concluded this month. Probably early November the announcement of the Commission will come as of what the outcome of this framework will be. The Council is very pleased to see that next generation access, deep fiber or FTTH will stand high up in the review. This is important, because the initial recommendation made no reference to deep fiber structure or next generation access architecture at all.

## Regulation and Policy: Selected Countries

- France: Public Policy & Regulation
  - > President and Government announce to push forward FTTH in France beginning 2006 – # of new FTTH announcements
  - > Free France Telecom, Neuf Cegetel, Numericable
- UK: Open Reach Functional Separation
  - > splits BT into service- and infrastructure-parts – UK FTTH slow
- Sweden: Public Policy push:
  - > broadband-friendly environment, tax-bonuses and money for installation of real broadband-connections – strong FTTH
- Netherlands, Spain: Public policy and high competition ( CATV)
  - > Netherlands : Municipal projects and KPN announcements
  - > Spain : Telefonica announcement

In general, regulation has failed to do anything but hinder FTTH investments, mainly because there is a great battle in the regulatory world between promoting investment and protecting competition. So, in Europe public policy has played a predominant role. For example France has, for a number of years, employed a very aggressive public policy initiative to fund municipal networks and has now also begun a more proactive regulatory approach. This is having a big effect in the market. The most dramatic regulatory intervention has been in the UK, which has forced to functionally separate BT. Right now this has made no difference, in fact some say it brought a negative effect in the ability for BT to invest in FTTH. In other countries like Sweden, Scandinavia and the Netherlands public policy has had actually a huge impact on the early stage projects. This is mostly manifested by public money given to sponsor local municipal networks.

## FTTH Council believes that key changes are required to Framework

FTTH Council call on the Commission to:

- Focus regulation on encouraging investment
  - > starting from the passive infrastructure (ducts) vs. focussing on Replicability issues alone
- Place a renewed emphasis on Geographic Segmentation Approach:
  - > (i) market driven (black) – (ii) policy driven (white) – (iii) grey areas
- Definition of a new market for physical passive infrastructure
  - > Ducts primarily
- Use a Gradation of Remedies approach:
  - > When ducts available, fibre relieved from regulation;
  - > When ducts not available (for any reason) access to fibre mandated taking into account the investment
- Clarification on indoor cabling rules

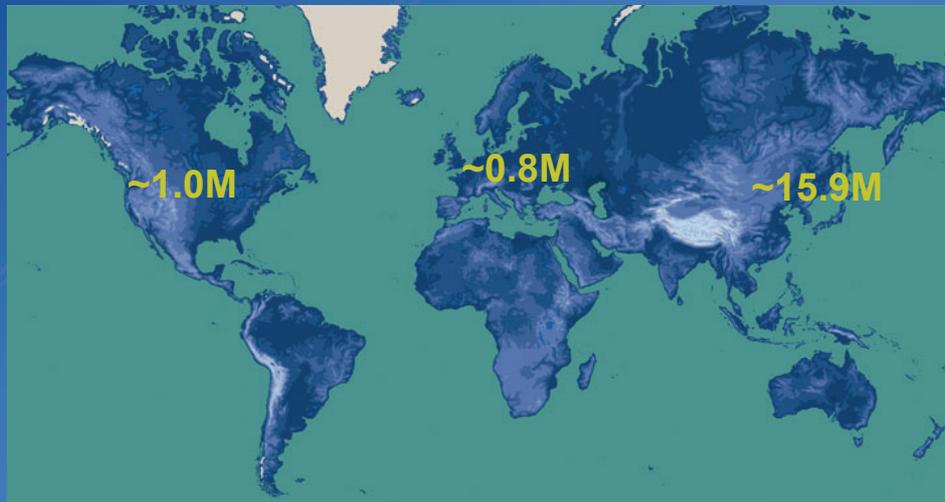
The Council is not sure what the final outcome of the framework will be. But I will briefly describe what the Council has been asking for. We are reasonably confident that some of these elements will be in the final review being issued in the next few weeks.

First, the regulation needs to address and create an environment where investment is promoted. This has not been the case so far. Most of the regulatory concerns have been about creating equal access to the existing networks. That is where regulators spend their time.

Second, the market has to be analyzed not in total but rather on a geographic basis. There are 3 types of areas to look at: The market driven area, called black area, where facility based competition already exists, we call for the complete removal of any regulation. The grey area, which is not competitive enough, needs to be regulated. In the remaining areas, the white areas, we call for a public policy initiative to promote the investments in FTTH for these markets.

One new thing will be the creation of a new market for ducts, a physical infrastructure. Finally, we asked for a dramatic simplification of remedies and for a clarification on indoor cabling rules.

## How does Europe compare?



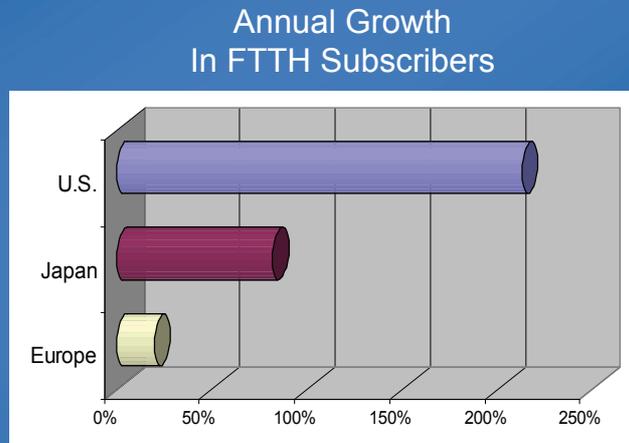
FTTH Homes connected mid 2006

In the following, the numbers I will show you are a year old, they are based on data from 2006, I like to apologize for that. We gather data in the Council once a year and we always do that in the third quarter.

In terms of FTTH connections Europe is behind. We have less than a million homes connected, significantly behind Asia.

## European FTTH Growth rate is lagging

- Europe needs more dynamism
- FTTH growth is slowing
- Issues to solve:
  - > Missing collective vision at Government/Commission level
  - > Adequate regulatory framework
  - > Only a few deployments by incumbents
  - > Web- and ICT-innovation is happening in US and Asia
- However the environment is improving



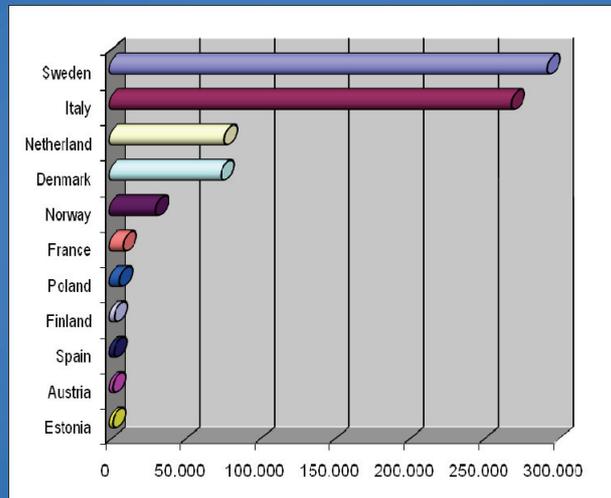
Source: RVA Render & Associates, LLC 2006

The problem can better be seen when looking at the growth rate. In 2005 Europe was significantly ahead in FTTH deployment. It had almost 500,000 connections at that stage. But this was an unbalanced growth. 75% of the connections at that time resulted from 2 companies, one in Italy and one in Sweden. In the intervening period, the net additions of connections and homes passed has slowed significantly. The good news is that since 2006 the environment has changed considerably.

## FTTH statistics Europe

- 3 Million homes passed, 800.000 homes connected by the end of 2006
- .. but deployment is concentrated in a few countries and regions
- Major FTTH-deployments started in France (Paris) Austria (Vienna), Netherlands (Amsterdam)
- First major Incumbent operator FTTH-announcements in France and Spain – also in Norway, Estonia, Slovenia, Luxembourg, Netherlands and Italy

FTTH Subscribers Q2 2006



Here are the numbers. You can see how unbalanced the FTTH deployment is, dominated by basically Sweden, Italy and the Netherlands. In 2007 we will see a much more balanced picture. A lot of very encouraging announcements have been made, notably from incumbents. These announcements will drive significant volumes in both green and brownfield environments.

## Technology and Operations Two Different Operating Models

### Vertically integrated operators

- > Builds /Own and operates the network

### Horizontal business model

- > Separates the build/operation of the network into different horizontal levels e.g. Fiber only, Bitstream only
- > Services provided by other providers
- > Often networks built by utility-companies or municipalities
- > Municipalities often share passive infrastructure with other operators.
- > Often associated with Public funding

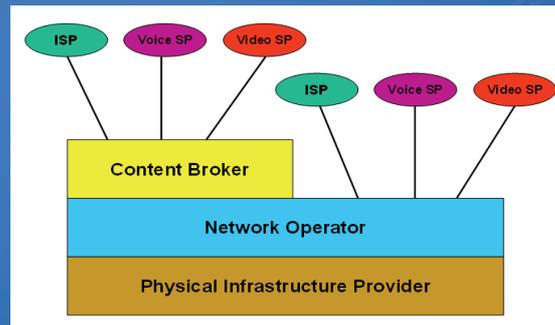
Let me quickly talk about some aspects of technology and operation. In Europe we have two types of operating models. In the vertical model an operator builds, owns and runs the network for his own benefit.

In the horizontal model, the operation is segmented and people run different parts of the operation. Services are usually provided by service providers and not by the people who run the lower levels of the network. Municipalities are often involved. One of the reasons, why this model is so popular in Europe, is that many of the projects are actually based on some type of public policy funding.

The vertically integrated operator runs a “classic” model. It is very simple, it is the normal model you would expect. The operator builds and operates the network and offers services on it. Every operator builds his own network. It is the typical model of existing incumbents.

## The Horizontal Model

- Network is built by an infrastructure provider
- Network is operated by a pure network operator
- This network operator does not offer any retail- services
- Network is offered to service-providers in a non-discriminating way
- “open access”
- Sweden, Finland, Denmark



The horizontal model can break up into a number of different levels. It is broken up into who owns the network and builds it, who manages the physical infrastructure, who manages the transport and bandwidths, who offers the services. It is an “open access” principle. All of the rates are transparent. This model is prevalent in Scandinavia, but you will also find it in most of the publicly funded projects.

## Technology and Architecture Selected Examples

Sweden:

- > Ethernet Point to Point is the most deployed technology

Denmark:

- > Mainly EP2P technology with a few GPON and EPON deployments

Norway:

- > Mainly FTTH architecture and EP2P deployments

Netherlands:

- > CityNet project : FTTH architecture and EP2P technology

Italy:

- > Mainly FTTB architecture and EP2P deployments

France:

- > FT: GPON Architecture
- > Free: P2P-Architecture

Source: IDATE

In terms of technology, in 2006 Europe is primarily an Ethernet point-to-point market. In 2006 we had actually 2 small projects which were GPON related. This situation has changed and will change dramatically. The major incumbents seem to be now moving in the direction of GPON. We do expect the PON portion of FTTH to increase significantly next year or so.

Let me talk about some of the FTTH European success stories by going through some of the projects, to give you an idea of what precisely is happening in the type of networks people are building.

## France Telecom



- why was FTTH chosen:
  - > Key to meeting customer demand for speed
  - > improved QoS , less OPEX
  - > only future proof technology
- Deployment plans
  - > FTTH in France/Slovakia : dense areas
  - > 2006 : 14,000 home passed in Paris / vicinity and 14,000 home passed in Bratislava
  - > 2007 : on-going roll-out in Paris & suburbs and in biggest French cities on going roll-out in 10 major Slovakian cities
- 2007-2008 targets
  - > 150 to 200 k connected customers and 1 M home passed

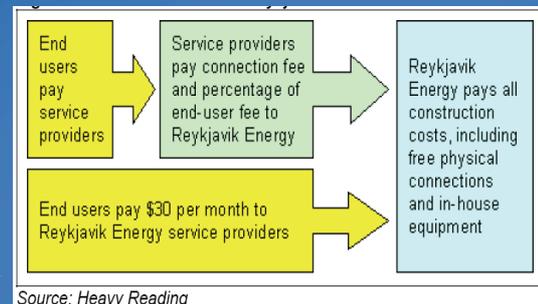


France Telecom will be a major deployer of FTTH. There are a number of reasons for that: The operational expense's improvements, the bandwidth to supply the services, but also the high level of competition. Another reason is the state of the copper network, a major determinant for the operator to choose FTTH instead of the VDSL solution. The length of the copper network and the density of the cabinet placement can also influence the economics of deploying FTTH versus FTTN type deployment.

The plan for 2007/2008 is 1 million homes passed and 200,000 homes connected.

## Reykjavik Energy

- Independent service company owned by municipalities
- 2004 – 2011- FTTH Deployment
  - > 300 companies connected and 2.000 homes connected in 2005
  - > 70.000 -80.000 homes (4-6 years)
- Equal access network, RE as an enabler – not service provider.
- Overbuild strategy
- Low connection fee (€25)
  - > Basic 100-Mbit/s connectivity
  - > Free-to-air TV, Gateway and set-top box
  - > Connects customer for free



Source: Heavy Reading

- Network funded entirely by RE
  - connecting about 50 percent of homes for a total cost of \$100 million,
  - connection cost per household of about \$2,000 to \$2,500
  - not expect a positive return on its investment for 14 years

Now I will give you some examples for the horizontal model, just to give you an idea how they function. One is Reykjavik Energy (RE), which is a municipality owned utility in Iceland. It is entirely funded by RE. RE builds the network and charges directly service fees to the end user. Independently, service providers provide services to the end users and charge them accordingly. In this model end users pay 2 bills. The payback period of 14 years is incredibly long. But this is not unusual for this type of projects. There is another example for the horizontal model. It is in Sweden and also a municipality owned utility. They charge the full cost for the connection to the customer, which is about €2000 in the beginning. Then all of the service providers pay a fee for access to the network.

## Free, Paris/France

- Replacement of ADSL2+ by FTTH
- Planned in Paris and everywhere in France where Free/ADSL2+ has a high market-share
- Free-customers will be upgraded for free, no change in monthly fees
- Investment planned: 1 billion Euros until 2012
- free also announced to open network to other operators



Free is a very important example. It is the first major example of a competitive built. A competitor who has come up through the local loop unbundling, to reach a significant scale in terms of market share of broadband. It has taken the next move forward to deploy FTTH. It is a very aggressive plan with over a €1 billion investment to connect over 10 million homes in various cities in France. It is also significant in terms of the type of cooperation with municipalities to bring down the cost of FTTH.

## Challenges for the Cable Industry

- Cost to deploy remains a key factor for investors
- Continued innovation required to meet some key challenges
  - > Ease of installation : Optical Fiber cable handling, bend management, better/faster duct/cable installation techniques
  - > Alternative cable technologies to exploit low cost rights of way and lower the cost to install
  - > Infrastructure sharing may become a key feature of the European FTTH environment
- Environment and Sustainability key issues to consider

We believe that the FTTH environment in Europe has taken a very positive turn in the past year. We are confident that the type of mission we have set for ourselves for Europe to reach about 3 million connections per year by 2010/2011 is achievable. There will be a few challenges for the cable industry to address that level of growth.

The cost to deploy is still a very important component. It is a tough business case. It will require innovations from cabling companies to assist that particular challenge. Some of the issues will be around ease and simplicity of installation. Better and faster installation techniques will be important.

One of the areas of public policy to watch out for is the low cost of rights of way, mostly by sharing public facilities.

Infrastructure sharing, particularly in buildings, is almost certainly going to become a reality.

We believe that with FTTH there are many other aspects of the environment in terms of carbon emission and so forth which will end up to be important.

In closing, I like to repeat:

- After stalling for a period, FTTH deployment in Europe is again showing strong signs of forward momentum.
- Operators across Europe are continuing to select FTTH as their technology for NGA.
- The FTTH Council Europe is committed to meeting the challenge of enabling a tenfold increase in FTTH connections in the next 3-5 year period.

Thank you for your attention!