THE LIGHT AGE

COMMUNICATING AT THE SPEED OF LIGHT

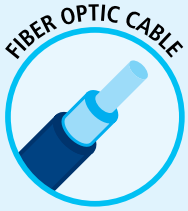
FEBRUARY 2015 · VOLUME 6

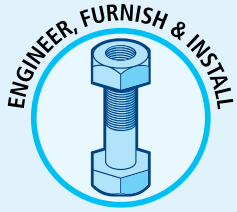
Creating Connected Continents

Bringing people together through FTTH

SMART

FTTx Networks





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The Light Age is published by the FTTH Council Europe.

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Europe Needs FTTH – A Call for Action

By Karin Ahl, President of the FTTH Council Europe

The year 2015 is a perfect year to bring a new dynamic into the broadband discussion in Europe. We are halfway through the second decade of the 21st century – and therefore also halfway towards the objectives for the Digital Agenda for Europe. We have a newly constituted European Commission with two new Commissioners responsible for broadband in Europe. And we ourselves are experiencing our lives becoming more and more connected!

The year 2015 must be a year of new dynamics for broadband in Europe. Our region still has a long way to go before becoming a truly connected continent of future-proof broadband networks. The good news is that we see an increasing number of decision makers all over Europe putting broadband at the top of their agenda. And most of them realise that FTTH will be vital to ensure a competitive and sustainable Europe. But at the same time there are strong and persistent forces that are trying to keep Europe in the stone age of telecommunications by further developing copper solutions, leaving rural areas behind with broadband connections that are even below the 30 Mbps Digital Agenda threshold.

We at the FTTH Council Europe therefore call for action in accelerating fibre roll out in Europe. All relevant stakeholders need to join forces to advance broadband connectivity on our continent and keep Europe competitive, sustainable and ready to face the challenges of the future. This is a huge project, but we know that reaching even the farthest distances starts with the first step. We have therefore identified a number of important first steps to enable Europe to make greater strides on its fibre journey:

Let's create a business-friendly environment: Building fibre networks requires big infrastructure investments. This will include public money as well as private investors and banks. To facilitate these investments, there needs to be a stable market environment that allows for good planning certainty and bankable business models. A stable FTTH regulatory framework is needed as well as sufficient public support.

Say fibre when you want fibre: The concept of technology neutrality is a huge roadblock for Europe at the moment. Decision makers do not feel free to advocate FTTH, even if this is what they want to achieve. Let's therefore either rethink the meaning of technology neutrality or let's find more straightforward alternatives. Rethinking the concept could mean setting broadband objectives based on the needs of the economy and society, instead of building networks based on existing (out-dated) solutions.

Openness for new business models: Many European operators have built business models based on maintaining, using and/or upgrading existing infrastructure. These models do not necessarily fit a FTTH infrastructure roll out. Furthermore, the widespread vertically integrated approach makes it difficult for long-term investors to support fibre deployments. It's time now to look at alternative business models. Many of these alternative models have already been successfully implemented in Europe: open access models with two or three layers, several separation models including structural separation, PPPs, etc.

A Europe of prosperous regions: How would you feel if you were told that your choice to live in a rural area was the cause for your not having a decent


Karin Ahl

broadband connection? A significant number of European households are facing this situation today. Even the Digital Agenda for Europe encourages this digital divide by setting two separate speed targets. Rural areas will die without broadband speeds that are similar to those of cities. Mayors all over Europe are deploring the relocation of young families and companies that are moving to the cities. Europe can afford to offer FTTH to nearly all households and businesses across the continent, and, if the right business models are used when making the investment, public money can be recuperated over time, instead of being lost in subsidies to operators.

An active role for states: Broadband is a key infrastructure. States therefore have an essential role to play to ensure a full and timely roll out of fibre networks. This does not necessarily mean that they have to build the networks themselves. On the contrary, by setting up credible broadband plans, creating the right regulatory environment and committing themselves to a future-proof solution, they will ensure a perfect balance between infrastructure and market needs. In addition, they will have a great opportunity to increase demand by using FTTH to provide public services like e-government, e-health, e-learning, etc.

> **"Let's work together in Europe to do broadband once and do it right"**

Give strength to the consumers: Customers have an important role to play in the broadband market. Their demand and take-up rates can determine if a business case will work or fail. But they also need better information and consumer rights. How can a typical end user understand the difference between an "up to" 100 Mbps connection with poor quality of service and high-quality 100 Mbps access through a FTTH network? There must be greater transparency and a more rigorous approach towards using the word "fibre" in marketing.

The year 2015 will be an important year for broadband in Europe and we believe that we are on the right track. Our call for action should help Europe move forward towards a truly fibre-connected continent.

All of the components necessary to guide Europe in the direction of a bright, connected future are now present: future-proof fibre technology to build the networks, investors and financing models to create viable business cases, end users in need of high speed connections, and an increasing number of decision makers who understand that FTTH is THE infrastructure of the 21st century.

The challenge now is to put all of these pieces together to enable fibre rollouts everywhere in Europe. It is up to all of us to make sure policy makers, network operators, regulators, investors and other involved decision makers jump on board in support of FTTH. Let's work together to ensure that in Europe we do broadband once and we do it right – then we will enjoy a bright future across a connected continent!

FTTH rises in the east

Despite being quite fragmented, the FTTH market in Europe is showing a steady level of growth

"Heavy Reading predicts that 51% of connections in 2018 will have been supplied by non-incumbent telcos"

Market research organisation IDATE has been monitoring the deployment of fibre in Europe on behalf of the FTTH Council Europe, and the conclusions of its market panorama have illustrated the success of next-generation networks in Eastern and Central Europe. The FTTH Global Ranking is based on the FTTH Council Global Alliance's definition of FTTH/B: it includes both Fibre to the Home (FTTH), where the fibre connection reaches direct to the household, and Fibre to the Building (FTTB), where fibre terminates inside the boundary of a multi-tenant building. The European FTTH ranking covers all European countries with at least 200,000 households where the penetration of FTTH/B has reached 1% of the total number of homes.

It's interesting to note that at the end of December 2013, Lithuania dominated the European ranking with a penetration rate of almost 35%, just as it had done in the 2012 edition. Sweden held on to the second position with a penetration rate of around 27%, while Latvia claimed the third spot with a penetration rate of approximately 23%. Norway and Russia make up the rest of the top five with rates of 20% and around 16% respectively. In terms of the Global Ranking, Lithuania, Sweden, Latvia and Norway make up the latter half of the top 10.

East versus West

In addition to highlighting the impressive rates of fibre penetration in Eastern and Central Europe, the rankings also show the relatively low rates of adoption in Western Europe. France, Spain and Italy, for

A review of Russia

It is predicted that over the course of the next few years, Russia will be by far the biggest FTTH market in Europe by number of homes connected, due in part to the sheer size of the country. Russia also accounted for nearly 45% of all the connections covered in the 'FTTH in Europe: Forecast & Prognosis, 2013-2018' report at the end of 2013.

The report estimated Russian broadband market connections at the start of 2014 at nearly 25m, against only 11m in 2009.

The report detailed that the Russian market has been driven by several large and ambitious competitive telcos who are deploying fibre to the basement of the large apartment blocks that dominate many Russian cities, in an environment where there is no real wireline alternative (very limited DSL). Much of the network is strung on the electricity infrastructure. However, most operators, including the powerful incumbent, Rostelecom, have now joined the FTTH build, with many now using GPON rather than Ethernet, pushing annual growth rates even higher.

In addition, the report highlighted that since there are a large number of apartment dwellings of a type suited to FTTH construction – many of which have already been passed by these networks – the potential for future growth is strong. In view of Russia's recent economic performance, the low cost of construction, low prices, strong competition among multiple providers and an appetite for broadband, Heavy Reading expects the current very high growth in households connected (more than 1 million per year) to continue. Furthermore, the Russian broadband market may be boosted by a national broadband plan the government is working on.

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At the end of December 2013, Lithuania led the European ranking with a penetration rate of almost 35%

example, all have penetration rates of below 5%, while the UK and Germany do not even appear, having not fulfilled the criteria of 1% household penetration. The disparity between fibre deployment in Eastern and Central European countries and those in Western Europe is due to a number of factors.

According to Graham Finnie, Chief Analyst at Heavy Reading, a research organisation that delivers deep analysis of emerging telecom trends, one critical factor is whether or not the incumbent telecom is fairly dominant and has a commitment to FTTH. In Lithuania, for example, the incumbent, TEO, made the strategic decision to shift to FTTH and built a fairly extensive network. In Finnie's white paper 'FTTH in Europe: Forecast & Prognosis, 2013-2018' he reports that in the second half of 2013, TEO reported 169,000 FTTB/FTTH customers, up 12% from 151,000 a year earlier, meaning that there are now more FTTH than DSL customers. Total homes passed was 778,000 (well over half of all homes passed) against 732,000 a year earlier. TEO began within FTTB, but since 2007 has deployed FTTH; it says it is now focusing on individual houses, mainly in larger cities at first.

"Most, if not all, incumbent telcos are trialling fibre but they are trying to avoid making that investment for as long as possible due to expense of switching from an existing copper infrastructure," Finnie explained. "There is a good level of interest in G.Fast (a transmission technology over twisted pairs of copper cables that is capable of delivering more than 1 Gbps – albeit over limited distances of about 100 metres) as it is positioned between FTTH and FTTC (Fibre to the Curb). However, there is no firm commitment."

The drive to upgrade

In Eastern European countries, according to Valérie Chaillou, Director of Studies at IDATE, the superfast broadband market – which encompasses all FTTx

Learning from LATAM – Uruguay enters the Global Ranking

The latest update of the FTTH Global Ranking, presented at the FTTH Conference in February 2015 in Warsaw, will for the first time include a country from the Latin American region: Uruguay. While it is the first country from this region to qualify, there are strong indicators that others will soon follow. The broadband market is very dynamic in Latin America, and an increasing number of households are demanding a decent broadband connection. There is no existing copper telecom infrastructure in place in many areas of the LATAM region, and so operators are taking the opportunity to roll out FTTH/B across these vast "greenfield" areas. Detailed information on the LATAM market can be found on pages 32-33 of this magazine.

architecture – is enhanced as soon as cable operators begin upgrading their infrastructures. "This can also have an impact on telcos that have to upgrade their networks, as traditional broadband is not efficient enough to enable end users to benefit from higher speed rates and value-added services, such as video streaming," she said.

Graham Finnie added that in many Eastern European countries the copper-based DSL infrastructure was in poor condition and didn't stretch very far, meaning that the growth of FTTH was almost organic due to its necessity. In Western European countries like France, however, DSL broadband is already very good, which again partly accounts for the lower FTTH penetration rates in the region.

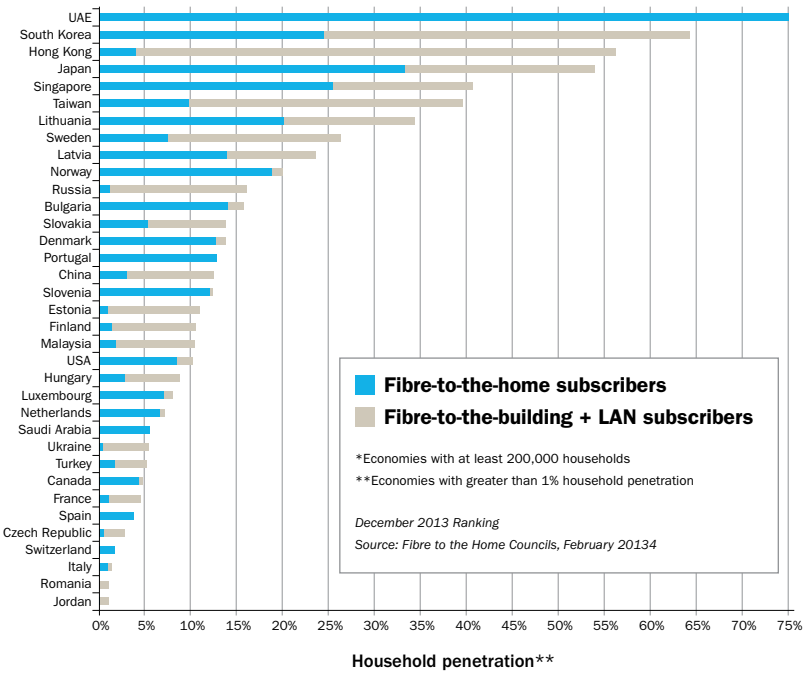
A disparity also exists within individual countries; specifically between rural and urban areas. Private telcos are hesitant to focus on rural areas due to the added expense. The solution, according to Chaillou, is for public authorities to be involved with FTTH deployments. "This can be at a national scale with governments deciding to devote a specific budget to the advancement of FTTH, or it can be at a local level with local authorities establishing private/public partnerships within their individual territories," commented Chaillou. "Some authorities may believe that there is still room for private organisations to drive FTTH, but that doesn't take into account the fact that deploying those networks is not only a question of cost, it's a question of time."

The future of FTTH

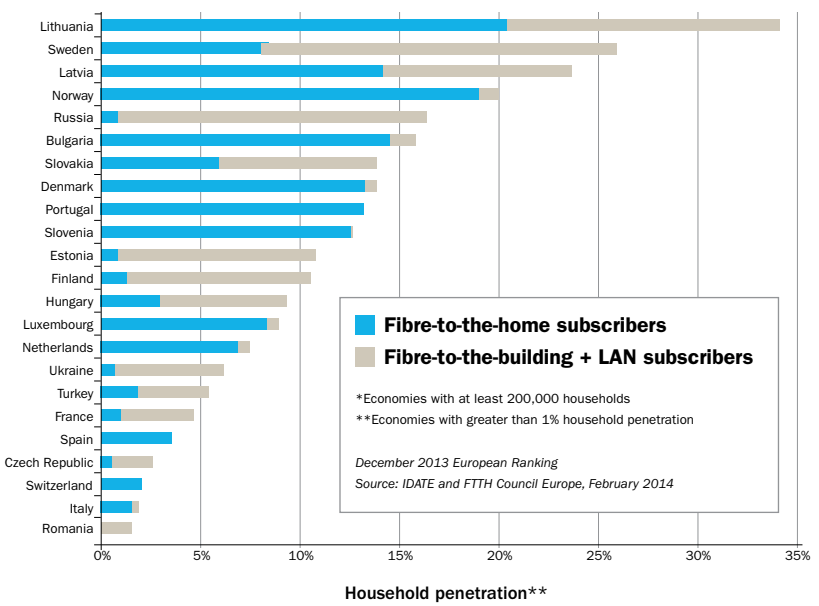
In 'FTTH in Europe: Forecast & Prognosis, 2013-2018', which was published in February 2014, Graham Finnie predicts that in the European Union about 22 million homes will be connected by the end of 2018, amounting to 10.6% of all homes in the EU. From the 21 countries analysed in detail, 12 nations will achieve "fibre maturity" (more than 20% household penetration) by the end of 2018 – in order, they are Lithuania, Sweden, Latvia, Bulgaria, Norway, Estonia, Russia, Slovenia, Denmark, Finland, Portugal, and Slovakia. (Among countries not analysed in detail, Andorra, Iceland, and Hungary, among others, will also have reached this total). It is predicted that Austria, Italy, Germany and the UK (Belgium, Greece and Ireland were not analysed in detail but are also expected to be in this group) will still have fewer than 10% of homes connected in 2018.

Russia will be by far the biggest market by number of homes connected, with an estimate of more than 15 million homes connected by 2018. Finally, Heavy Reading predicts that 51% of connections in 2018 will have been supplied by non-incumbent telcos. This reflects the importance of both the big projects in Eastern European nations led by competitive telcos, as well as vigorous competition elsewhere and in some cases strong municipal and utility involvement.

Global economies* with the Highest Penetration of Fibre to the Home/Building + LAN



European economies* with the Highest Penetration of Fibre to the Home/Building + LAN



Setting the agenda

Launched in May 2010, and updated in December 2012, the European Commission's Digital Agenda for Europe (DAE) aims to help Europe's citizens and businesses to get the most out of digital technologies and boost Europe's economy. Among the 13 specific goals are: the entire EU to be covered by broadband above 30 Mbps by 2020; at least 50% of European households subscribing to Internet connections above 100 Mbps by 2020; and to increase regular Internet usage from 60% to 75% by 2015, and from 41% to 60% among disadvantaged people. It is hoped that efforts to reach DAE goals will further drive demand for FTTH-enabled services.

Polish potential

Poland is facing a crucial moment of decision regarding its digital strategy

The FTTH Council Europe sees a great deal of potential when it comes to the penetration of Fibre to the Home (FTTH) in Poland. This is emphasised by the Council's decision to hold the 12th edition of the FTTH Conference in Warsaw on 10 to 12 February 2015.

Historically, Poland has lacked a modern telecommunications infrastructure, but that situation is changing. With a total of 77,000 FTTH/B subscribers, Poland did not appear in the last edition of the European FTTH Ranking[1] because – with only 0.51% of Polish homes subscribing to FTTH/B at year-end 2013 – it has not yet reached the 1% threshold. However, as one of Europe's fastest growing economies, there are plenty of opportunities to embrace FTTH. And while the pace of fibre adoption may be somewhat slow in Poland, the country can be viewed as the gateway to Eastern Europe where FTTH deployment is showing impressive levels of growth in countries like Lithuania and Russia.

One key factor that will determine the future of FTTH in the region is that the Polish government is currently setting its digital strategy for the next five years. Using funding from the European Union (2007–2013), long-distance fibre networks have been installed across the country, and the government must now decide how best to connect end users into that network. The first step involves setting out a comprehensive plan to connect the country's citizens by the year 2020 – in line with the targets set out in the Digital Agenda for Europe. With this in mind, the FTTH Council Europe is calling on Poland to put FTTH at the heart of its digital strategy.

"Now is the time to make the right decision for Poland's future," said Karin Ahl, President of the FTTH Council Europe. "FTTH is the only future-proof way to build broadband access networks, and it is our strongly-held view that public money should ONLY be spent on future-proof infrastructure. We are encouraged by what we hear, and we hope that Poland will soon join the world's leading FTTH economies!"

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Warsaw will host the 12th edition of the FTTH Conference

Valérie Chaillou, Director of Studies at IDATE, agrees that 2015 is the time for Poland to begin to embrace FTTH. "The challenge for FTTH in Poland is the current leadership of cable providers within the superfast Broadband market. Those players are upgrading their infrastructure in order to enable end users to benefit from higher speed rates and better connectivity. The relative improvement in speed creates further challenge for players interested in FTTH due to the additional costs and extended deadlines," commented Chaillou. "As a result, Polish telecom companies remain primarily focused on VDSL broadband for the moment.

"However, the drive towards the European Digital Agenda is encouraging the government to cover all households with FTTx infrastructure that will enable them to benefit from a minimum connection speed of 30 Mbps," she continued. "Couple this with a move by Polish public authorities to devote funds to the development and deployment of networks in rural areas, and we will see Poland fulfil its broadband potential; ideally with a focus on FTTH."

> **"Now is the time to make the right decision for Poland's future"**

[1] *The Global and European FTTH Rankings are based on the FTTH Council Global Alliance's definition of FTTH/B: it includes both Fibre to the Home (FTTH), where the fibre connection reaches direct to the household, and Fibre to the Building (FTTB), where fibre terminates inside the boundary of a multi-tenant building. The European ranking covers all European countries with at least 200,000 households where the penetration of FTTH/B has reached 1% of the total number of homes.*

Game On!

Relying on low network latency and unwavering connectivity, gaming companies can rise or fall by broadband infrastructures

Poland's mega gaming festival, the Poznan Games Arena, has just concluded its most successful event ever. To those not familiar with the video games industry, the size of the event is a bit of an eye opener. More than 60,000 people congregate in one of the oldest cities in Poland to enjoy the most modern of leisure pursuits – eager to immerse themselves in new games, check out new hardware, and compete in e-sports tournaments. Outside the arena, many more thousands followed the competitive action via streaming video services such as Twitch.

The executive team of the FTTH Council Europe heard a lot about the Polish games industry as it made preparations to take its annual conference to Warsaw. More than just a bit of fun, the international gaming industry is big business, with revenues more than double those from the film industry. Poland is starting to stand out as one of the major players on the international scene, both as a creator and as a consumer of video games.

As a nation, Poland is already second in Europe when it comes to PC gaming popularity with 98% of its 13.4 million gamers playing on this screen in 2013, according to research by Newzoo. Meanwhile, Polish computer game developers have produced titles that have attracted fans from far beyond the country's borders. Arguably the most famous of these is role-playing video game The Witcher, created by Warsaw-based publisher CD Projekt Red.

The original Witcher, released in 2007, was based on the work of fantasy writer Andrzej Sapkowski, and has been described as the Polish equivalent of "Lord of the Rings". The main character, Geralt of Rivia, is a monster hunter with superhuman reflexes. The sequel, Witcher 2, sold more than 1.7 million copies globally, catapulting its creator into the limelight and a listing on the Warsaw Stock Exchange. Excitement is growing over the release of The Witcher 3 in February 2015.

Indeed, the digital games industry in Poland has come to represent the country's transformation to a fast-growing European free market. When Barack Obama visited Poland in 2011, the country's Prime Minister, Donald Tusk, gave him a copy of The Witcher 2. For him, the gift symbolized modern Poland. It was a memorable gift; in a return visit to Poland earlier this year, the US President commented how CD Projekt Red's creative output is a "great example" of Poland's contribution to the new global economy.

The FTTH Council Europe has also had some interesting conversations at a very high level about broadband in Poland, and how the worlds of gaming and broadband are becoming increasingly intertwined. Digital distribution allows games developers to eliminate the costs of manufacturing and distributing boxed games, and can be useful as a tool to combat piracy. But more than that, it opens up new business models where games can be provided as a service for a monthly fee, rather than a one-off purchase.

Video streaming of games is also on the increase. Streaming can be used to provide resources,

Video games that rely on low network latency, such as The Witcher series, emphasise the benefit of fibre connectivity

especially complex high-definition graphics that would otherwise take too long to load, so that game play can begin as soon as possible. The separation of the game logic from the content in this way is an increasing trend in the industry. And watching others play video games has become a pastime in its own right, via streaming services like Twitch.

Latency is also an important issue for gamers and games developers. Very low latency (network delay) is necessary for gamers to have a good experience playing online games in a real-time environment, such as massively multiplayer online role-playing games (MMORPG). Fibre to the Home (FTTH) networks provide much lower latency than copper-based telephone networks, which makes it easier and more attractive to develop and play interactive online games.

As the business models around video games increasingly move towards digital distribution and interactive content, Poland's broadband access networks could become a limiting factor in the local market. Poland has lower broadband penetration rates than the European average, and the government hasn't finished working on its access network strategy to ensure that the country can meet Europe's Digital Agenda targets for ultrafast broadband.

The Digital Agenda target that more than half of households should subscribe to internet at speeds of at least 100 Mbps is hard to reach without putting serious amounts of fibre in the ground. Studies commissioned by the FTTH Council Europe show that, although the total number of Fibre to the Home subscriptions in Poland is currently low – just 77,000 at the end of 2013 – there was an increase of 47% over the year. Meanwhile, the number of Polish households within reach of FTTH increased to 488,000 by year-end 2013, an increase of 22% year on year. The number of subscribers is growing more quickly than new networks are deployed – a positive sign that indicates increasing demand for high-speed broadband services, and growing market maturity.

The FTTH Council Europe is confident that the Polish Government understands the importance of FTTH, and has no intention of letting its citizens or the gaming industry suffer from unnecessary lag. Government officials have provided tremendous support, lending their patronage to the FTTH Conference 2015 in Warsaw. The Council hopes that new initiatives by the Polish Government can stimulate further investment and growth in FTTH.

> **"Latency is an important issue for gamers and games developers"**

Sweden – A role model for Eastern Europe?

In the late 1990s, Sweden became the first country in Europe to create a broadband policy with the goal of creating "an information society for all". Broadband was a relatively new technology at the time, but the Swedish government's investment has paid off in many areas, including the games industry. The Swedish Games Industry trade association, Dataspelsbranschen, produces an Index that analyses Swedish game developers' activities and international industry trends by compiling key figures from the respective companies' annual reports. According to the 2014 Index, revenues of Swedish game developers increased by 76% to €752 million in 2013, and the industry as a whole has reported a total profit for five years running.

Online gaming – playing a video game over a computer network – has become a lucrative mainstay that enables companies to extend their reach, stream new content, and forge closer relationships with players. This level of immediate communication depends greatly on the stability of the Internet connection and the efforts of FTTH have contributed to the success of the gaming economy in Sweden. The Index highlights that Game development is a growth industry – more than half of the companies were registered after 2010 – and the average annual growth rate (CAGR) 2006-2013 was 39%. Dataspelsbranschen believes that everything points to continued growth for Swedish game development in 2014.

A solution through structural separation

A new report from Diffraction Analysis asks: Can structural separation via spin-offs help Europe achieve its broadband ambitions?

> "Investment is more likely to happen in a structurally separated model"

The Digital Agenda for Europe (DAE) states that by 2020, Europe should achieve download rates of 30 Mbps for all of its citizens, and at least 50% of European households subscribing to Internet connections above 100 Mpbs. Currently, the progress is 62% and 3% respectively. So, how can these objectives be achieved when the European Commission (EC) and governments cannot directly force private or public companies to invest?

Approached from a capital market perspective, investment is more likely to happen in a structurally separated model, where the network assets and operating unit are hived off into a separate company (or companies). A way to achieve this is via a spin-off. For example, the passive network infrastructure (the NetCo) and the operating unit (the OpCo) could be spun out from a stock-market listed incumbent, allowing for corporate 'new structuring' (as opposed to the rather negative term 'restructuring').

In the mobile sector, there are many examples of companies spinning out or selling off telco infrastructure assets, but with fixed access infrastructure, there has been resistance to the idea of separating last mile infrastructure.

How can a spin-off add value?

There are broad reasons that apply to all industry sectors, but some that are specific to the telco sector:

- The sum of the parts is worth more than the whole
  - In conglomerates, individual business valued separately may be worth more than the conglomerate itself, due to complexity of management overheard, poor resource allocation, slow decision making, and so on. In the European telco sector, investors have difficulty in finding telco infrastructure pure plays.
- Information asymmetries can be resolved
  - The value of the SpinCo may initially be hidden within published segment financial results; true value may only be obvious once the spin-off occurs.
  - Regulatory accounting requirements and financial accounting desires often conflict. A way forward may be to mandate functional separation of accounts, and to apply and audit IFRS financial results.
- Capital structure can better match investor demand
  - The fixed access network has long-term contracts, and steady and predictable cash-flows, giving it a higher debt capacity.

What is a spin-off anyway?

Technically speaking, a spin-off of subsidiary company S (SpinCo) from a parent company P is a pro-rata distribution of shares in S to shareholders in P. This is different from either an equity carve-out or a full or partial sale. In a carve-out, the parent company retains a majority share, while the remainder is offered via an IPO to the public, creating a new entiy (CarveCo). An M&A sale is a transaction between the parent company and a buyer, creating a new entity (SaleCo).

Real-world examples of these three models are:

- New Zealand's Chorus, almost a textbook example of a spin-off;
- Australia's National Broadband Network (NBN), which would be a SaleCo under the above terminology;
- Telecom Italia, which proposed a 'structural separation' that would meet the CarveCo description.

Chorus

The initial plan was to separate Telecom New Zealand (Telecom) into three units: access (called Chorus), wholesale and retail. However, a think tank report prompted the creation of the Ultra-Fast Broadband (UFB) project, which was to be delivered by a state-owned company, Crown Fibre Holdings (CFH). CFH would invest upfront in the network up to the curb, and work with a private partner, who would only invest in the final connection from curb to customer, if the customer signs a contract.

As a result of this project, Telecom bid for the private partner work, and Chorus won 69% of the business, on the condition that it was structurally separated. Exhibit 6 in the original report summarises the main points of the Chorus-UFB agreement.

However, due to action by the regulator, certain incentives to promote fibre were no longer available, and a change to the proposed bitstream price threatened the self-financing capabilities of Chorus.

Ultimately, Chorus had to revise its entire business and financial model; its share price collapsed and its credit ratings were cut.

NBN

In 2009, the Australian government insisted that the incumbent Telstra undergo either voluntary structural separation or mandatory functional separation. Telstra chose the former, but retained ownership of the existing access network. It argued that the deal it struck with the government minimised the loss for its shareholder, but many believe the opposite to be true.

In the end, Telstra's shares outperformed the market, and Telstra has not, to date, alarmed the credit market.

Telecom Italia (TI)

In 2012, the chair of TI announced a restructure plan that effectively placed structural separation as a solution for the debt-ridden company. The resulting asset side would include passive and active infrastructure.

However, the proposal was not based primarily on copper-to-fibre migration. The proposal, then, stopped short of full structural separation, and neither could it be described a 'spin-off'. See Exhibit 11 in the original report for how the proposal did not overcome its limitations.

Subsequent board changes meant that the separation plans were shelved, largely because parties could not agree on a valuation for the fixed access network.

Beware the reference scenario

In the case of Chorus and NBN, the government 'forced' a separation, but incumbents should not need a 'stick' to consider structural separation via spin-off. The value release alone should be sufficient incentive. The situation changes, however, when management has identified another idea which it proposes to stakeholders: the government (which might also be a shareholder), the National Regulatory Authority, shareholders, and employees. This is the 'reference scenario'.

There are two options for the EC: Option A is to follow a proposal that promotes investment for deregulation (leading to market consolidation); Option B is structural separation spin-offs. The latter does not rule out market consolidation, but offers better possibilities for infrastructure investments.

How to mastermind a spin-off transaction

There are nine stakeholder groups of relevance:

The government: Have the power to exert political power in the telecoms market, and are concerned with maximising votes in elections. Thus, short- to medium-term ICT policy objectives are increased employment and mitigation of usability bottlenecks.

The regulator: A reactive bureaucracy with no mandate to define economic policy. Can develop innovative approaches, but may also protect activities of the incumbent.

Shareholders: Need to approve transactions, and therefore need to understand the value of any alternative.

Debtholders: Need to endorse any spin-off, and therefore protect against potential default payments.

Management: Interests of employee managers not always aligned with those of owners/shareholders. Tendency to fear the exploration of new avenues, to maintain current strategy rather than change, and concentrate on cost-effective quick fixes. Owners do have the option to align interests of management through incentives, but this is not done well by current European incumbents.

Employees: Overstaffing already exists where incumbents inherit workforces from state-run monopolies. Employees therefore view any new structure with suspicion, fearing job cuts. Any proposal, therefore, should protect the labour rights and status of employees.

Retail customers: Could view spin-off as a way of placing fibre upgrade costs on customers, so prices need to be structured in a way that prevents public upheaval, and even leads to buy-in.

Wholesale customers: Spin-off should create a superior market structure, whereby all service providers are treated equally with access to the same wholesale products. However, price regulation will remain necessary after spin-off.

Competitors: Depending on the origination of the spin-off, competitors may have concerns: government policy may favour the spin-off inadvertently, or an integrated spin-off may have competitive advantage through parent company.

Averting trouble in a post spin-off world

Certain post-spin-off problems can be avoided, and three main structures influence this process:

Separation structure: Must be transparent, both for employees (regarding contracts, status and pension claims) and from a financial perspective (being explicit about intercompany supply agreements, for example).

Market structure: Due to regulation or non-compete clauses, the spin-off should be forced to remain an infrastructure provider (rather than developing into a service provider, for example). It should also be possible for the parent company to engage other infrastructure companies, thus promoting competition.

Ownership structure: In countries where the government owns a direct or indirect stake in the incumbent, a spin-off is a suitable way to concentrate ownership on national assets and divest shares in a competitive retail business.

Conclusions and recommendations

Here are some high-level recommendations to the various players:

Governments and policy makers: Structural separation may not solve all issues, but the spin-off is the best way of achieving it. A credible national plan for a copper-to-fibre migration strategy is a necessary regulatory element. A spin-off also creates value release.

Investors: In addition to value release, a spin-off would address a number of environmental, social and governance (ESG) issues.

Supervisory boards: A spin-off is a promising approach and good starting point to liaise with policymakers and regulators.

> **"Structural separation may not solve all issues, but the spin-off is the best way of achieving it"**

Further Information

The report is written by Thomas Langer, senior analyst, and Benoit Felten, chief research officer of Diffraction Analysis. For further information, and to enquire about the full report, visit www.diffractionanalysis.com

Cost comparison analysis of distribution and drop cable installation in FTTH deployments

Analysis of costs associated with FTTH distribution and drop cable deployments often focus on reducing the skill set needed for installations, thus reducing labor costs. Plug and play scenarios are often thought of as ideal methods of construction to reduce field deployment costs. All measurements are taken, poles are counted, yards are walked, models are built, orders placed and then pre-terminated solutions are deployed in the field by relatively novice technicians. However, when one looks at the pre-terminated solutions versus build-in-place solutions we see differences in costs and benefits that might not fit expected models. Analysis of three deployment methods produces some interesting results.

There are three segments of cable in a typical FTTH deployment: feeder, distribution and drop cable. Feeder cables connect from the Central Office (CO) to a distribution point. This location is a cabinet such as Fiber Distribution Hub (FDH), splice closure, or maybe a telecom closet if a building is available. From this point, distribution cables are routed past homes and businesses. Installed along this distribution cable are access points to connect drop cables to the subscriber.

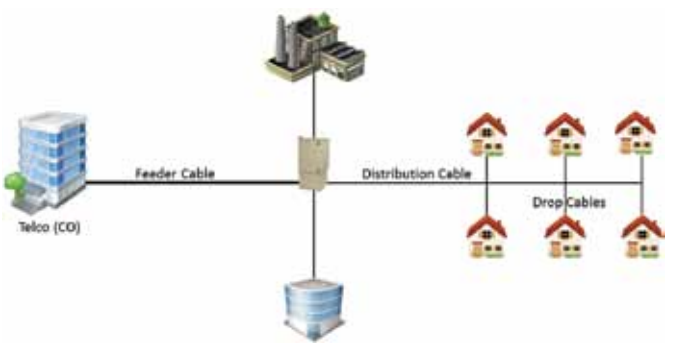

Fig. 1 – Basic FTTH layout

Distribution and drop cable installation methods are unique and present significant differences in costs. Taking a closer look at deployment of distribution and drop cables, we can compare three common installation methods: cable and closure, long tail optical access terminal (LT-OAT), and engineered cable system (ECS).

Several factors are assumed for comparative analysis, and common items are removed from calculations, as they would be constant between installation techniques. For this analysis, we assume a complete turnkey system deployment. Variations of constructions methods will change the numerical results, but the overall trend in data and conclusions for the study stay the same. Installation of the feeder cable is well understood and omitted from this cost comparison analysis. Fig. 2 denotes the basic layout used for analysis along with estimated drop lengths.

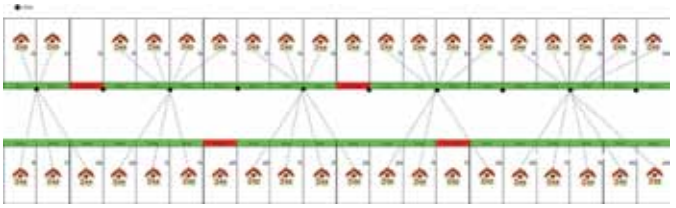

Fig. 2 – Drop Cable Layout

Cable and closure installations use a traditional method of cable hanging and closure placement. Using common craft techniques, the distribution cable is attached to poles with 10 metres of slack placed at anticipated optical access point (OAP) locations. At each OAP, a closure is attached to accommodate drop cables. The distribution cable is mid-span accessed and 12 fibers are spliced to pigtails in the closure. Drop cables then run from the closure to each individual subscriber. Length of the drop cable can vary quite a bit and is cut to a specific length for each subscriber. Skilled technicians trained in splicing and cable installation, along with the required equipment, are necessary to complete cable and closure installation.

Fig. 3 - Cable and Closure Layout

In long tail optical access terminal installation a distribution cable is placed to a central splice point in the span. Optical Access Terminals (OATs) are placed at OAP locations and the tail routed back to the splice closure. OATs are pre-terminated in the factory and deployed as a sealed closure in the field. Harsh environment adapters installed on the OAT allow for pre-terminated drop cables with harsh environment connectors to install quickly in the field by novice technicians. Although the pre-terminated OAT removes some splicing from the field, skilled technicians are required for splicing the OAT tail to the distribution cable.

Fig. 4 - Long Tail Optical Access Terminal Layout

An engineered cable system is completely pre-terminated factory distribution cable and drop assemblies. OAPs are built into the cable as jacks or short length pigtails that short-tailed OATs are then attached to. Some slack is designed in to adjust for lengths to match the OAP desired location, but for the most part the cable is installed and the OATs are placed. Installation of the pre-terminated drops for each subscriber is then completed. This method of installation requires the least skilled technicians, as no field splicing of cable is required.

Fig. 5 – Engineered Cable System Layout

For distribution cable installation, contractors are typically used. These contractors charge by time, project, or piece part and sometimes a combination of the three. How the installation is billed will make a significant difference in the total cost of distribution cable installation. In the analysis of costs, a piece part method of billing was used to better assess the costs differences on the component level.

Placing optical access points (OAPs) along the distribution cable can have a significant impact on costs. Based on the three types of distribution and drop cable installation methods described, one can understand why there is a significant difference in the costs of installation. In the cable and closure method the distribution cable is mid-span accessed five times, splicing 12 fibers each time. In the LT-OAT method there is a single splice point, but still 60 optical splices are made. The ECS system removes splicing from the field entirely, but material and cable placing costs increase. From the chart below, we can see the differences in costs associated with this segment of installation. Based on analysis of labor costs the ECS system has lower build cost and thus it seems to produce the largest margin for the contractor. The LT-OAT ends up with higher build cost due to additional labor involved with lashing of the long tails.

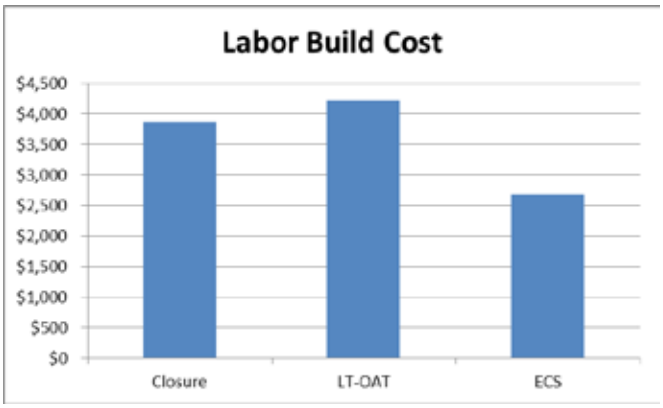

Fig. 6 – Distribution Cable Placing Cost Comparison

Now labor build costs are just one component of the installation costs. Once we factor in the material costs associated with each installation method, we find ECS is actually the highest cost. Due to the highly engineered nature of the ECS product, the value that the contractor would normally add to the installation process is transferred to the manufacturer and thus higher material costs drive up the overall costs of the installation.

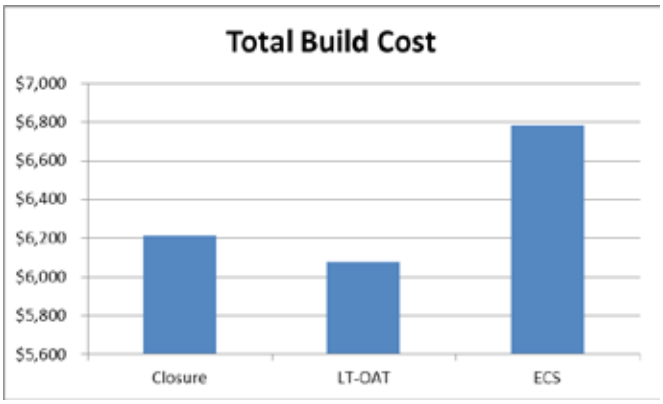

Fig. 7 – Total Distribution Cable Installation Costs Comparison

Drop cable installation costs are much simpler to analyze. We will ignore the labor costs of the actual connection from OAP to the subscriber, as this is same for pre-terminated versus cut to length. When we look at just the material costs, we find costs savings associated with cut-to-length solutions of an estimated 20 percent or more reduction in drop cable waste. This cost savings offsets the costs of field termination. Pre-terminated solutions are purchased in set lengths and additional cable is stored or cut off during installation. There are also inventory considerations of storing multiple lengths versus bulk cable, but this is not considered in cost estimates. With these considerations the actual estimated costs of drop cable deployment is relatively the same as shown in Figure 7.

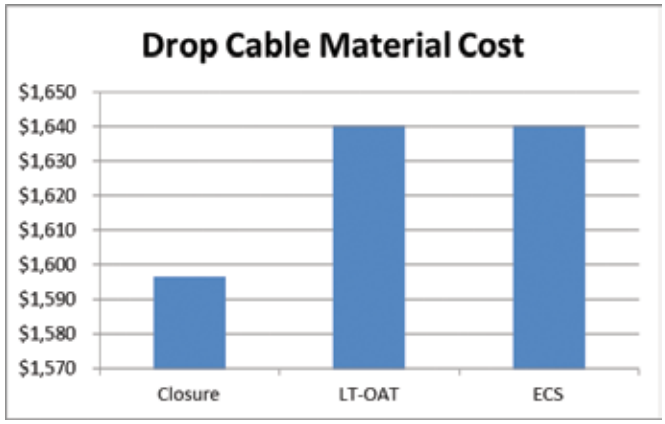

Fig. 8 – Drop Cable Material Costs

Further breakdown of the three methods of deployment provides some insight into the flexibility of each method. Primarily of concern is placement of OAPs and when those units are placed. In well-established areas where growth is complete and stable, ECS and LT-OAT have some advantages since the infrastructure is known and the number and types of subscribers is not likely to change in the next 25 years. The lower profile of the hardware and the ability to have novice technicians complete the install makes these methods attractive. However, when we look at areas prone to further development a cable and closure method has the flexibility to be installed and OAPs placed where and when needed avoiding having to reconfigure or over lash existing cable.

Although costs are different, we assume in our analysis the contractor is paid on performance of the number of homes passed along with additional spare fiber placed regardless of type of installation. A contractor adds the most value to the project by completing the work in the field with the cable and closure method versus placing a plug and play system. Depending on the extent of construction, turnkey cable and closure installation can command 10 percent or more profit over the pre-terminated solutions.

Looking at the total costs associated in Fig. 9 with the three deployment methods discussed we find the ECS system has the least skilled and lowest cost technicians for installation, but ends up costing the most to install due the higher engineered material costs. The cable and closure and LT-OAT methods end up about the same so, other factors such as billing methods and material procurement will determine which method is more favorable solution for given deployment.

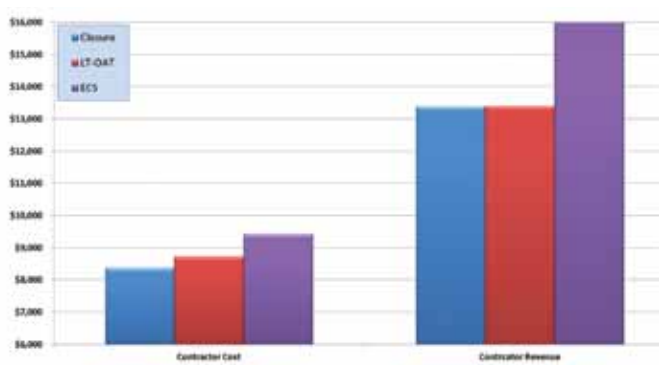

Fig. 9 – Contractor Costs and Revenue

Although pre-terminated solutions are attractive in reducing the skill set needed for deployment, analysis of costs associated with FTTH distribution and drop cable deployments does not support the costs savings often associated with these methods. Focusing on reducing the skill set needed for installations, thus reducing labor costs, may not be the best solution or most cost-effective method of deployment. Contractors performing a majority of the installation in the field to complete drop cables and install closures where and when needed in many circumstances costs the same or less than the engineered systems.

***Roger Vaughn**, Product Technology Manager, AFL*

The Need for Action

Europe needs to act now to ensure future-proof broadband coverage

Policy makers should define a clear vision for Europe in terms of the development and deployment of its communications networks, and the FTTH Council Europe believes that by applying appropriate and measurable targets for these networks, an expressed preference for 'fibre-first' will result. The Council is concerned that the on-going interpretation of the technological neutrality principle set out in Recital 18 of the Framework Directive[1] appears to be (a) not technologically-neutral and (b) not logical in the European regulatory context.

In the opinion of the FTTH Council Europe, setting targets in order to include as many technologies as possible does not lead to technological neutral and is a misinterpretation of the principle. For instance, simply setting download speeds without any corresponding upload speeds explicitly includes technologies that cannot deliver high upload speeds and thereby favours them even though Europe needs that functionality. The Council is strongly in favour of a neutral approach to technology that sets more measurable, appropriate and evolving targets related to the quality of experience for end users, such as latency and jitter (critical to the deployment of certain services), as well as taking into account average bandwidth at peak times and that include targets for upstream bandwidth.

Technological neutrality

While the FTTH Council Europe agrees that market players are best placed to make technology choices in well-functioning markets, that view is turned on its head where markets are characterised by market failure. In Europe, the fixed physical infrastructure market is characterised by market failure (leading to regulation) in each of the 28 markets in the European Union. There is a dominant entity in every one of these markets and that entity is regulated – it is never free to choose prices or to whom it grants access. And yet, when it comes to technology choice, the European Commission fails to take a position and in doing so allows the cheapest market foreclosing technology choice to emerge.

The Council does not expect the European Commission to specify the actual technology, but it should at least specify the characteristics it would like to see in technology choices (technology parameters, openness, development paths, etc.). That the European Commission does not specify these characteristics does not make sense in the context of the European regulatory framework.

The FTTH Council Europe sees FTTH-like solutions (FTTH, FTTB, FTTO, etc.) as the only future-proof answer to growing broadband requirements. Fibre solutions are not only required in their own right but are also necessary to support the wider broadband ecosystem, including advanced mobile solutions such as 4G and 5G. The Council sees mobile markets as working efficiently for now – a view shared by the European Commission where market failure on access markets is rarely, if ever, identified. While the European Commission chooses not to favour technologies with better socio-economic profiles in deference to private investors, where public money is spent, a strong preference for future-proof solutions should be inherent in any tender.

The FTTH Council Europe thinks technology neutrality should only operate once appropriate broadband targets and technology characteristics have been defined. Excluding unsuitable technologies would still provide the market with a set of options, ranging from PON variants to P2P and even G.fast (which in some scenarios would be part of an FTTB roll-out).

Holistic approach

Governments need to rethink the organisation and delivery of public services and how that delivery can be organised around the new technology choices Fibre to the Home enables. Investment in next-generation access (NGA) needs to form part of a much broader plan (national plans) which requires joined-up thinking across a large number of service areas. Each business area must realise and highlight the benefits that such networks can deliver in their area so that a holistic approach can be adopted.

The FTTH Council Europe believes that the use of public funds to support a widespread deployment of FTTH is justified since it will facilitate enormous benefits for the economic and social development of any country that deploys and uses FTTH networks. A study by Ovum for the FTTH Council Europe looking at the socio-

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economic benefits of fibre found that the provision of fibre at a municipal level is regarded as having positive benefits on health, education, and other public services. These benefits range from reduced telecom costs to more efficient and new services. This is particularly true in rural areas where limited resources and physical distance are barriers to service quality.

The extent of indirect benefits derived from fibre rollout is supported by a number of studies[2]. While this is particularly true in more isolated areas where end users face significant travel requirements and an even more pronounced inability to engage with others and consume public services off-line, similar benefits can be anticipated in urban areas. In terms of usage, one study found that users largely consumed the same services and used fibre in much the same way, but importantly, that users of fibre used much more of these services. For instance, those tending to work from home spent over 20% more time working from home once they had upgraded to fibre. Similarly, users of education, eHealth, and eGovernment all increased usage once they had migrated to fibre. With more and more emphasis on supporting public services, using smart grids to manage energy consumption, and with more emphasis on health and education as means to achieve the Europe2020 strategy goals, the spill over benefits of fibre investments are potentially enormous and justify public sector support.

While the FTTH Council Europe believes that market forces are best placed to move the mass market, it does not believe that society should be denied the benefits of FTTH networks over prolonged periods. Deeper Government involvement may be appropriate in certain circumstances. Pervasive market failure and regulatory intervention in every EU fixed-access market identified by national regulators and endorsed by the European Commission has been noted. The Council sees the absence of large-scale private FTTH deployments pointing to an ongoing and continued need for public support.

Under the EU State Aid rules, private investors must be notified of an intention to deploy public funds to build network, and in the event that a private investor has built or intends to build a network in the next 3 years, public funds cannot be used. However, public investments in FTTH do not enjoy the same protections that private sector investments enjoy – publically-built networks can be overbuilt by private investors. This creates risk for public sector investors that private sector investors do not share.

The Council's recommendation is that credible national plans should be defined that mitigate risk for investors and that make FTTH the business enabler and ensure the availability of adequate public finance. In addition, strong preferences for FTTH-based solutions should be a requirement of any public funding tenders, and public and private sector investors should face the same conditions to avoid market distortions and ensure that NGA overbuilds that distort competition are avoided.

Finance and industry models

The FTTH Council Europe proposes that policy makers should examine and facilitate a market structure that enables investments in future-proof fibre access networks that can offer higher up- and download speeds, better consumer experience and better reliability. It also suggests that the Digital Single Market should, at a minimum, facilitate a market structure that reflects the different economic and risk profiles of different assets (i.e. passive telecom infrastructure vs active technology equipment). Open access networks are also advocated so that consumers can enjoy innovative service from all players, including incumbents.

The Council notes that the current industry structure in communications is vertically integrated; that is, communication networks and services integrate a large utility component (perhaps as much as 90%) with a small minority technical component. The unfortunate result is

> **"Fibre solutions are not only required in their own right but are also necessary to support the wider broadband ecosystem"**

that finance views the entire project as being technology driven and therefore seeks a higher return over a shorter period. A different structure in the industry could allow a vast amount of investment to be rerated. Telecom Italia, for example, whose own ability to raise capital is severely constrained with a net debt to cash-flow ratio of 3.4, recently considered pursuing structural separation as a means to release value for shareholders while simultaneously facilitating new capital-raising.

Other industry players are also talking about 'layering', whereby the services part of the business would be treated at arms-length to the infrastructure part of the business. Their logic is to recognise that the services business is a global business whereas infrastructure is local.

The FTTH Council Europe agrees with this analysis but believes it is not sufficient to simply restructure telecom operators as separated-entities. These separated entities would still face problems, as the structure of the project debt has a major impact on its attractiveness to investors. Projects that can be paid on availability (e.g. a school or hospital) are much lower risk projects than projects whose return is dependent on demand or usage (toll-roads, energy generation and communications networks). Clearly, communications networks as currently structured and financed have a significant level of demand risk attached. Within the community of projects for long-term financing, communication networks will likely sit a long way down the preference order.

However, the covenants attached to such projects in terms of buying commitments may ameliorate that situation, and a movement to new structures such as 'wholebuy' agreements (where customers of the infrastructure commit to a minimum buy) or underwriting by the government (or some combination) could push preferred projects even with higher risk back up the preference order. Therefore, the FTTH Council Europe believes that in this critical sector, the European interest would be improved if the public debate would also include aspects such as 'wholebuy' and not only 'wholesale' business models. Wholebuy commitments from network operators have the potential to attract the interest of long-term investors by lowering covenant risks. Furthermore, member states could underwrite the first X% in wholebuy, a share which guarantees a return for investors but which diminishes as market demand evolves.

Other models of investment, including co-investment, should also be considered with a regulated utility model showing a lot of desirable characteristics over a competition-based model of deployment.

“ Strong preferences for FTTH-based solutions should be a requirement of any public funding tenders ”

Ensuring transparency

End users are also facing a level of difficulty as they are often not properly informed about the services they receive, or are likely to receive when signing up for a broadband connection. This is due to the fact that 'up to' advertising suggests that consumers will receive speeds that are often never available. In other sectors, such misleading advertising is not tolerated – purchasing a litre of milk which only has 700ml in it, for example, would immediately lead to action.

The European Commission has through a series of studies and surveys noted the poor relationship between actual and advertised speeds, with 75% of the advertised speed being delivered on average and with xDSL performing particularly poorly with 62% of the advertised speed delivered[3].

The mislabelling of product has an important distortive effect on consumer choices, and in turn these misinformed choices send inappropriate investment signals to network operators. Furthermore, the parameters specified need to go beyond speed and include metrics for other Quality of Service parameters that effect service delivery on-net, such as latency and jitter.

Studies suggest that consumers will pay for higher speed once they understand the difference that exists between high and low capacity networks. Over time, FTTH consumers on average deliver 46% higher ARPU than DSL consumers[4]. Misleading advertising can undermine the transition from low to high speed since uninformed consumers don't realise the difference and would not be prepared to pay for higher priced, though better, service. Such misleading advertising would artificially depress the fibre premium.

If consumers do not understand what they are buying, then they cannot send appropriate investment signals to market operators. The FTTH Council Europe acknowledges on-going efforts to increase transparency of network performance and actual versus advertised speeds. In the interest of consumer protection, the Council believes that published results should make a comparison of network technologies and service providers possible. The issue of network transparency is not simply one of user rights (though these are important), but is an issue regarding the development and take-up of advanced networks and services which will have an impact on the general economy. Well-informed consumers with choice of suppliers will enable a more dynamic and responsive market to the benefit of consumers and industry.

As a solution, the FTTH Council Europe believes that National Regulatory Authorities (NRAs) should monitor and collect accurate network metrics from network operators, which are then published. This would allow NRAs to judge the correspondence of actual versus advertised broadband speeds in the name of transparency and the assessment of network management. Furthermore, NRAs must have the ability to sanction blatantly misleading advertising. ●

[1] *Directive 2002/21/EC of the European Parliament and of the Council of 7 March 2002 on a common regulatory framework for electronic communications networks and services ("Framework Directive")*
[2] *For example: Enck J. and Reynolds T. (2009) 'Network Developments in Support of Innovation and User Needs' OECD. See also Ovum 2009 'Fibre: the socio-economic benefits'*
[3] *https://ec.europa.eu/digital-agenda/en/news/quality-broadband-services-eu-samknows-study-internet-speeds*
[4] *http://www.diffractionanalysis.com/2012/05/09/free-webinar-successful-ftth-service-strategies/*

FTTH and FTTx

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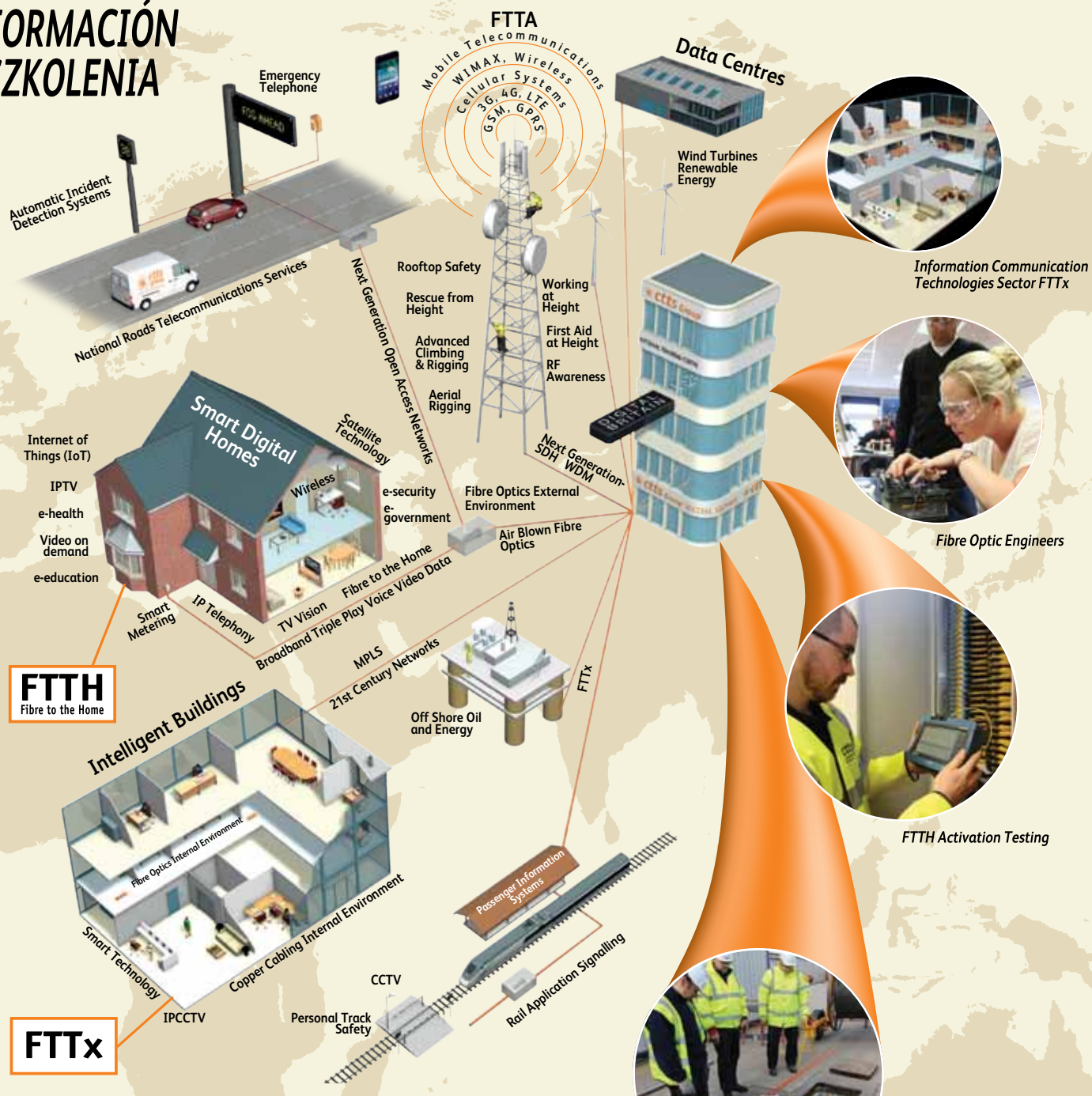

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Moving forward in Brussels

The FTTH Council Europe offers its perspective on the EU's strategy for the next five years

The widespread deployment of FTTH will have enormous benefits for the economic and social development of Europe. Many of the potential uses of FTTH, such as home working and home-based eHealth applications, have significant impacts which can be classified as positive externalities. In the case of home-working, this could be the relief of traffic congestion, allowing other commuters to save time, as well as positive environmental impacts. In the case of home-based eHealth applications, the benefits could be decongestion of healthcare facilities as well as financial savings to the State. In these circumstances, the benefits accruing to society often go far beyond the direct economic benefits identified by investors.

Many of the challenges facing Europe were identified in the Commission's EU2020 strategy, including aging populations and the increased pressure on healthcare systems, as well as environmental sustainability and the need to lift economic productivity. The FTTH Council Europe believes that FTTH networks can help deliver or enable a significant part of the solutions to these problems via service providers in the different sectors of the economy where these issues have been identified.

European Commission President Juncker has clearly recognised the need to create value by basing growth on knowledge, empowering people in inclusive societies and creating a competitive, connected and greener economy. At the heart of each of those drivers is a fully operative digital economy and, while that digital economy has many facets, ensuring that users have access to the necessary networks is a fundamental point for each. The fact is we are moving more and more to a FTTH solution that will bring fibre directly to the subscriber – but we are not moving fast enough, particularly in a context where many other aspects of Europe's future depend on that infrastructure. President Juncker has put two heavyweight Commissioners to oversee the rapid move to the Digital Single Market and has also identified broadband infrastructure as a recipient of his €315 billion investment fund – his intent could not be clearer.

Other broadband solutions, particularly wireless, may

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also play an important role but will in no way act as demand substitutes – nor will they be able to exist independently of FTTH roll-outs. The realistic growth of wireless solutions, for example, will only be possible in urban or semi-urban settings with pervasive fibre backhaul capacity. The need for a FTTH solution is entirely consistent with the need for technological neutrality as it relates to the realistic future capacity needs of end users.

Research shows that the economic and societal benefits of very high speed Internet access (particularly high upload speeds) and the availability of such connectivity changes the way consumers react to the Internet. One of the biggest functional differences between FTTH and DSL options is the potential upload speeds. The many business cases put forward by different analysts rely on a variety of services which require radically different upload speeds. A key service that requires such symmetry could be online education or a health application that would require two way video. For example, home health care for the elderly where such systems and networks are in place could prolong the period in which older citizens could be cared for at home and lead independent lives without any loss of supervisory care. The indirect benefits in terms of relief of healthcare resources at a time of rising demand (which is likely to accelerate due to European age profiles) is clear but is unlikely to factor in private investor considerations.

The FTTH Council Europe believes that any future vision for the economic and social development of Europe needs to clearly incorporate the functionality of FTTH and recognise the indirect benefits that such networks can enable in this sector. The network targets of the Commission set out in

the Digital Agenda sought a 50% subscription to networks delivering 100 Mbps or more; this implies an availability of such networks that will be close to ubiquitous. The Commission in its strategy needs to support and anticipate the availability of these networks in their forward looking policy framework.

These very high speed networks can enable a set of services which are capable of completely changing certain aspects of the economy, such as education or healthcare delivery. There are many other enablers that are correctly identified by the Commission in its various consultation documents, and the FTTH Council Europe endorses these measures. Increasing awareness, ensuring interoperability, creating legal certainty and R&D are all clear enablers of a future digital environment in Europe, for instance; but the FTTH Council Europe is concerned that all of the enabling activities currently identified as priorities will have a relatively limited application unless and until the required and essential basic infrastructures are in place.

It may be that service providers who could provide innovative digital services simply need much higher bandwidth in order to allow users to simultaneously use a number of applications, such as high-definition video or symmetric video. Moreover, many current applications, and more so in the future, also need the reliability of FTTH – for example connected healthcare applications – and FTTH networks are significantly more robust than existing networks. This is a very important non-speed factor if critical healthcare elements are to be put online as reliability and customer trust in the networks involved will be at the heart of their success or failure.

In the FTTH Council Europe's view, policy should be re-orientated to enable the transition from upgraded copper to FTTH to take place. In Europe today, there is no difference in regulatory treatment of FTTH over upgraded copper solutions, although a future-proof FTTH technology is preferable from a socio-economic perspective. It might be expected that some preference for a better technology would be put in the regulatory treatment of these technology choices.

FTTH has many desirable properties, such as higher bandwidths, symmetrical bandwidth, lower latency and jitter, which policy makers with upgraded targets would wish to see deployed. Other factors, such as the length of time to switch copper networks services to fibre-based service delivery, also need to be reviewed. While the FTTH Council Europe believes only competitive markets will drive take up (and investment) where sufficient wholesale access is available over fibre, operators should be in a position to switch off their copper networks when they want. Minimum notification periods should be abolished. FTTH investments will drive employment both in the short and medium term, and a coherent plan to utilise these investments to enhance public service and private services can lead to significant multiplier effects on the benefits.

When a FTTH network is being deployed a review of the Weighted Average Cost of Capital (WACC) should be conducted with an additional percentage available for FTTH assets above the prevailing copper-based WACC in order to encourage such investments.

Policy makers have misinterpreted technological neutrality to mean that all technologies should be included, whereas in fact the defining text notes that advantageous technological characteristics should be promoted, i.e. should have a preferable regulatory treatment. This will be critical if Europe is to make the necessary investments that it needs in the future.

A review of the EU2020 targets in the Digital Agenda area must set realistic network usage targets that focus on consumer experience and, after that, let the technologies fall where they may. The absence of upload speeds and quality of service network parameters does not make sense and cannot be justified. The Commission should express its preferences for technological characteristics by allowing preferable returns and conditions to apply to such technologies. Where technological choices must be made there should be a fibre-first principle in operation.

A fibre-first principle would mean that the starting position should always be that a FTTH network is built but allows that, with justification, this could be altered in specific instances. The basis for technological neutrality is Recital 18 of the Framework Directive, but it explicitly allows specific services to be promoted where justified, and the FTTH Council Europe believes such a justification exists for the promotion of FTTH over copper solutions. The FTTH Council Europe thinks technology neutrality should only operate once appropriate broadband targets and technology characteristics have been defined.

"Any future vision for the economic and social development of Europe needs to clearly incorporate the functionality of FTTH"

Achieving the vision of FTTH

The FTTH Council Europe believes that what is needed is a clear and well-justified set of targets with clear technology objectives. A basic starting point is common goals. Right now Member States are putting in place their Partnership Programmes setting out the spending of their allocations under the Multi-Annual Financial Framework 2014-2020. Many have, in line with the National Broadband Plans, made significant financial contributions to extend high-speed networks into rural areas. The Barroso II Commission was largely silent in terms of guidance and preference for what kinds of capabilities network investments should achieve and this allowed, even encouraged, significant investments into short-term copper-upgrade solutions. When a once-in-a-generation investment needs to be made, a lack of guidance is not appropriate. The Commission has a vision and should support those infrastructures that best enable that vision to be achieved. The FTTH Council Europe expects the Juncker I Commission to add considerable clarity on the kinds of performance and capabilities network investments should meet.

New Fibre to the Home technologies

FTTH technologies are addressing the needs of operators now and in the future

As the massive deployment of Fibre to the Home (FTTH) networks continues worldwide, operators require next-generation FTTH technologies to enhance capacities and service support capabilities, coexisting with their existing equipment and outside plant. This evolution of technology has become a key issue within the telecom industry.

Existing optical access networks using technologies like GPON and Gigabit Ethernet (GE) can provide cost-efficient capacity to residential consumers for many years to come. As the number of connected users increases and new highly demanding services – such as HDTV, 3D-TV, multiple image and angle video services, growth in unicast video (versus multicast), cloud computing, teleconferencing, and multiplayer HD video gaming – become widely adopted, more capacity will be required. The industry is already looking into the next steps that will enable capacity to be boosted over existing fibre networks. Mobile backhaul and business services are also beginning to take advantage of FTTH networks. It is important to understand that the higher capacities available via optical access networks represent an attractive, lower cost option compared to leased lines.

The PON world

Business services and mobile backhaul are expected to require sustained downstream and upstream data rates of 1 Gbps and beyond. Because residential customers usually require the peak rates for shorter durations, their requirements will be less demanding. Thus, current PON technologies are a good fit for residential users; however, they lack the necessary capacity to follow rapidly increasing demands for business and mobile backhaul. This issue will be addressed by next-generation PON, which will also provide the higher capacity and quality of service levels required. Furthermore, next-generation PONs will enable the smooth evolution from existing optical access networks – which are mainly used for residential services – to converged access networks comprising residential, business services and mobile backhaul.

In 2006, the special interest group Full Service Access Network (FSAN) and the ITU Telecommunication Standardization Sector (ITU-T) began to consider the system that would follow GPON. Since the optical distribution network represents between 50% and 80% of total investments in FTTH networks, future ITU-T standards need to be backwards compatible, enabling operators to re-use their existing investments. In 2010, ITU-T Recommendation G.987 – 10-Gigabit-capable passive optical network (XG-PON) systems – was defined, based on a TDM-PON architecture.

The XG-PON1 approach provides 10 Gbps of shared downstream capacity, combined with 2.5 Gbps of upstream capacity. Inheriting the framing and management from GPON, full-service operation is provided via higher data rates and larger splits. This adds more features and capacity to the optical distribution network, without increasing the complexity. For GPON and XG-PON systems to coexist on the same network the addition of a wavelength coupler located at the central office is required. This has already been defined as WDM1r in ITU-T G.984.5.

A potential barrier to the deployment of GPON and XG-PON1 on the same outside plant is the existence (or non-existence) of wavelength blocking filters at the ONTs in the customer premises. Most modern GPON ONTs have an integrated filter to eliminate interference from XG-PON1 wavelengths. However, older installed ONTs may not have such a filter. Service providers with older ONTs deployed will have to install filters at the ONT locations to enable GPON and XG-PON1 co-existence.

Next-generation technology, NG-PON2, is expected to increase PON capacity to at least 40 Gbps downstream and at least 10 Gbps upstream by 2015. Multiple XG-PON1 systems are operating on different wavelength pairs in a DWDM scheme, so that they can be "stacked" onto the same physical fibre plant. This TWDM-PON approach is considered to be less risky, less disruptive and less

Targetting 100 Mbps

Commercial triple-play service packages today offer residential customers typical speeds between 20 and 100 Mbps, and the European Commission has set a target that by 2020 half of all households in Europe should have broadband subscriptions at speeds of at least 100 Mbps.

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expensive than other considered approaches because it reuses existing components and technologies.

NG-PON2 allows operators to place the different technologies – GPON, XG-PON1 and NG-PON2 – on the same optical distribution network. Coexistence is ensured by a passive element, called the coexistence element (CE), which combines/splits the various wavelengths associated with each technology generation. When implementing NG-PON2, the main challenges are the spectrum allocation (compatibility with sensitive radio frequency services is essential) and the need for tuneable ONTs, which must be able to send and receive signals on any of the specified wavelengths.

The ONT transmitter must be tuneable while the receiver requires a tuneable filter. These ONTs based on tuneable transmitters and receivers are likely to be more expensive than GPON ONTs, though optical component vendors are developing new technologies to help bring down costs – for example, temperature controlled lasers, photonic integrated circuits (PICs) in the ONT, etc. Further developments are designed to reduce power consumption in the ONT in line with the EU Code of Conduct on Energy Consumption of Broadband Equipment.

The theoretical capacity of optical fibre is extremely high; the limitations mainly arise from the combination of lasers, amplifiers, and other equipment used to send and receive the optical signal. Commercial long-haul optical transmission systems with up to 8 Tbps of total capacity are available today. However, the economics of long-haul networks do not translate into the more cost-sensitive local or access networks. The roadmap for the long-term evolution of PON networks indicates that the technology can be expected to address 100 Gbps data rates over distances in excess of 100 km by 2025.

The new PON standards allow the coexistence of different generations of PON technology. The proposed NG-PON2 standard offers a clear path to higher capacities, and therefore is expected to address the needs of operators in the future. Some operators are targeting a direct migration from GPON to NG-PON2, and may therefore skip XG-PON1.

The Ethernet world

Ethernet-based FTTH deployments have been based on Fast Ethernet (FE) with 100Mbps symmetrical capacity for many years. When the cost of Gigabit Ethernet (GE) with 1Gbps symmetrical capacity approached the cost of FE a few years ago, GE became the standard technology for this type of deployment.

The relevant standards for single-mode single-fibre Ethernet deployments are included in the IEEE 802.3 standard as 100Base-BX10 and 1000Base-BX10, for FE and GE, respectively.

A dedicated GE per residential subscriber will provide enough capacity for many years to come. For business services and backhaul applications, however, the limits of 1Gbps have already been reached in many cases.
The obvious next step – 10 Gigabit Ethernet (10GE) – was specified back in 2002 as IEEE 802.3ae. The standard, however, still lacks a single-fibre version which would obviously be called "10GBase-BX10". Many vendors of optical modules have, nevertheless, developed modules which implement single-fibre transmission, anticipating some future standardisation of the relevant wavelengths (everything else can be taken from the existing standard). Most existing Ethernet access nodes already support 10GE interfaces, enabling 10GE-based access and aggregation solutions to be readily implemented.

"The industry is already looking into the next steps that will enable capacity to be boosted over existing fibre networks"

The final hurdle

One of the main hurdles for Fibre to the Home is the "fiberisation" of the last few metres towards the subscriber. To circumvent the high costs associated with this last segment, so-called "copper-extending technologies" have evolved. G.Fast is the latest transmission technology over twisted pairs of copper cables and is capable of delivering more than 500 Mbps – albeit over limited distances of about 100 metres. Bitrates indicated for G.Fast are always meant to be the sum of upstream and downstream bitrates. These bitrates can be allocated by an operator to implement any degree of asymmetry or full symmetry. G.fast can be used in the context of FTTB and can help pave the way to full FTTH. Standardised, commercial products can be expected from late 2015 onwards.

Alternative FTTH Deployment Technologies

Addressing fibre deployment methods could dramatically speed up the pace of FTTH roll out in Europe

Despite the slow pace of investment in fibre access networks in Europe compared to regions such as Asia Pacific, Middle East and North America, there is no doubt that a Fibre to the Home (FTTH) network is the best technological solution. The question, however, is how to build a network that is not too costly to deploy or operate. Because of the long distances to homes, sparsely populated rural areas are the most expensive to connect, while densely populated urban environments present construction challenges.

This disparity means that the investment required can vary considerably depending on the geography being served. In some situations, civil engineering represents 50% of the overall cost, while in others it can amount to as much as 80%. New deployment methods, equipment and products are currently being considered in a bid to not only reduce the cost of building the network, but increase the speed of FTTH deployment.

A white paper by the Deployments & Operations Committee of the FTTH Council Europe takes a look at alternative deployment methods which can help saving money on the fibre roll out. The following examples offer insight into the wide variety of FTTH installation solutions. Whether those solutions can provide a significant impact on the deployment itself depends on the specific project and the economic and legal framework they are subject to.

The use of existing infrastructure is often considered as one way of reducing the scope of civil works, and there are a few options available. The first is to share the duct and pole infrastructure of the incumbent telecom operator, although this approach remains quite controversial in many countries and regions.

A positive example of infrastructure sharing is France where the regulatory authority defined rules for duct sharing, and the access process was agreed in 2008. Since then the main alternative operators – Free, SFR, and

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Deploying FTTH in urban areas presents construction challenges

Numericable – have started to deploy their cables in the ducts and on the poles belonging to the incumbent operator Orange (France Telecom). The poles belonging to ERDF (energy utility) are also used.

It is estimated that around €2.5 billion was saved over five years by eliminating civil works for new cables in France, and similar savings could be made in the coming five years. The cost savings from duct sharing can dramatically improve the return on investment for FTTH projects, and in some cases projects have been executed that would otherwise not have been possible.

In the duct

When sharing ducts, a few practices can be observed: in some cases, cables from different operators in the same duct must be physically separated (which requires sub ducting), and the operator who deploys a cable needs to guarantee that there is enough remaining capacity in any given duct

section so that its competitor can deploy a cable of the same size in the same section. As the duct infrastructure was initially designed for only a single operator, it is important to use the remaining duct capacity in the most efficient way.

One of the possibilities is that operators use smaller or flexible cables that take up less space as the fee for renting duct space can be directly correlated with the cross-sectional area of the cable that is installed. Another alternative could be flexible textile inner ducts that take up to three times less space than rigid inner ducts, maximising the number of cables that can be installed. Such flexible inner ducts can also be considered where rigid ones have failed during installation because the duct was filled with dirt or was partially crushed.

Utilising utilities

Technologies for using utilities are not new; they have been used in few cases already for many years. While these technologies look very appealing for those who have to deploy fibres, the owners of these utility infrastructures are not always equally enthusiastic. Therefore, for successful deployment in existing utilities, the interests of the owners of these infrastructures have to be taken into account. The opportunities to use these infrastructures should not be overestimated – they are currently not used for true mass deployments but rather on a case-by-case basis to facilitate deployments in certain areas.

Residential gas pipes, sewer systems and water pipes offer the possibility of innovative infrastructure sharing, both in the feeder part of the network and in the final drop to homes. A method even exists to re-use cable sheaths as conduit for optical fibre.

Using the existing sewer system to install fibre-optic cables offers additional possibilities to reach residents. Given that sewers are buried deeply in the ground, they are less vulnerable to accidental damage. In addition, during the construction process errors in the sewer system can be detected and mapped. It is important, however, that the installations do not impede the flow of waste water, and that the materials used are resistant to toxic gases. The installation also has to withstand traditional sewer cleaning methods. The final consideration is that cable laying equipment may need to pass corners and joints in the sewer system.

Water pipes

Water companies have put control and data cables inside their drinking and waste water pipes to create networks for their own use, and with the advance of FTTH there has been a demand for new subterranean paths for the optical distribution network. Two systems have been developed in Europe over the last few years to install fibre-optic cable in domestic water pipes, and do so in a cost-effective and environmentally-friendly way.

The first system requires a small access hole to be dug at the demarcation point in the footway or road, and another at the property wall. Short sections of pipe are removed and replaced by new 'Y'-shaped branches. The branch fittings use standard plumbing screw-fit connections, allowing rapid installation with no special tools. A microduct with 5mm diameter is then inserted between the two branch fittings, providing a gas-tight route through which fibre-optic cable can be blown either immediately or at a future date.

The second approach targets fibre connections to multiple occupancy buildings. From an access point, typically located in the basement or utility connection room of the building, a 7mm-diameter conduit is fed into the domestic water pipe until it reaches an access hole in the street. Joints are integrated into the pipe by electrofusion welding. Single fibre-optic cables are then fed through the conduit from the street directly into the basement without any further excavation. By minimising the need to excavate, and by reducing the time taken to deploy the cable, both solutions can significantly reduce deployment costs.

A third alternative, the use of residential gas pipes, involves integrating a conduit into the connecting service pipe. Depending on the required capacity, fibre cables can be pushed mechanically or conveyed under compressed air through the conduit at any time after the conduit has been installed. The interfaces for the conduit and fibre cable lead-outs/lead-ins are integrated reliably and permanently into the gas supply pipe using electrofusion welded fittings – a procedure commonly practised by utilities companies.

In contrast to the drinking water solution, this approach always requires two access holes because local regulations stipulate that the adaptors in the gas pipe must be located outside the building. The fibre must then enter the building through a separate opening in the building wall. All of the components, pipe, fittings, conduits, and connectors must comply with the technical requirements of the local gas supply regulations and standards, and be certified accordingly. To be used in the gas main, the materials must be resistant to natural gas and its admixtures. The pressure drop and the throughput can be calculated to verify suitability, and impediments to supply capacities caused by the main's smaller cross section at the conduit are generally negligible.

Final thoughts

The investment requirements for FTTH have decreased substantially in recent years, and further reductions in the cost of deployment could dramatically speed up the pace of FTTH roll out in Europe. No single innovation can solve all FTTH cost issues, however, and some methods may not be suitable or appropriate in any given situation. For example, installing cables in water or gas pipes requires co-operation from utility companies, and this is not always guaranteed. But it is important that every project considers that there are alternatives to the standard methods of carrying out the installation. Reducing the deployment cost can improve the FTTH business case, which will help to speed up the roll out of FTTH in Europe.

For a more complete and thorough overview of the subject of FTTH deployment, please see the FTTH Handbook, produced by the Deployment & Operations Committee of the FTTH Council Europe.

“Using the existing sewer system to install fibre-optic cables offers additional possibilities to reach residents”

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FTTH Council Global Alliance – five FTTH Councils working on a global basis

The FTTH Council Global Alliance (FCGA) is the platform for cooperation for the five global FTTH Councils. All FTTH Councils share a common goal: the acceleration of Fibre to the Home adoption. They all act as powerful and independent organisations in their specific market. This regional focus gives the FTTH Councils a special strength to adapt their activities to the particular market situation in their area.

The FTTH Council Global Alliance ensures that those regional efforts are combined with the power of global cooperation. Within the FCGA, the FTTH Councils exchange studies, information and the latest market developments. Joint projects allow global activities and intercontinental networking.

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Africa's coming of age

2014 saw rapid expansion in telecommunications infrastructure in Africa. A surge in demand for Internet access and broadband capabilities is accelerating this fixed-line reawakening

According to Hamiliton Research, the creator of Africa Bandwidth Maps, Africa's total inventory of terrestrial transmission networks has more than doubled in the last five years. The sixth edition of the Africa Telecom Transmission Map shows that by June 2014, the total inventory of terrestrial transmission networks had increased to 958,901 route kilometres, compared to 465,659-km in 2009.

Over the same period, Africa's international Internet bandwidth increased twenty-fold, and has passed the 2 Tbps mark. By December 2013, Africa's total international Internet bandwidth reached 2.034 Tbps; a 38% increase compared to 2012. A key factor underpinning this bandwidth growth has been the expansion of terrestrial fibre networks inland. In the last year alone, an additional 25 million people across Sub-Saharan Africa were brought within reach of a fibre optic node.

Historically, Africa has been the world's most rapid growing market for mobile communications, mainly because of the size of the continent. The difficulties of rolling out fixed-line networks across its vast land mass have meant that in mid-2011 mobile users constituted around 90% of all African telephone subscribers. In an attempt to satisfy ever-hungry consumers, mobile operators had to invest in mobile backhaul, to the point where there is a proliferation of fibre optic infrastructure in metropolitan areas, and so Fibre to the Home (FTTH) was born.

Whilst satellite continues to play a significant role in reaching Africa's extensive rural and remote areas, more telecommunication companies are announcing FTTH strategies, and foreign investors are scrambling for positions in this lucrative market. The phenomenal growth of telecommunication has been touted as one of the great investment opportunities on the African

"African governments have now realised that connectivity bridges many divides"

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Areas like Nairobi benefit from an expansive fibre optic infrastructure

continent over the last 10 years, and those who capitalised on it have generally enjoyed a great return on investment. In the past decade, investment in Africa is up by an average of 80% and forecasts indicate it's likely to reach $150 billion by 2015. African governments were quick to realise the potential the telecommunications industry poses and have put great effort into changing their investment environments.

Almost every national Telecommunications Department in African countries has announced a broadband strategy stressing ubiquitous access. Most strategies have achieve dates of 2020, 2022 or 2030.

All too often, excessive regulation, state monopolies result in low investment. Over the past five years, much of this has changed and African governments and regulators are working hard on policies that enhance openness to ensure high and sustained economic growth. African governments have realised that connectivity bridges many divides and provides massive potential for rural communities, including social inclusion. Africa represents incredible potential.

The promise of gigabit broadband

Fibre On Fire in the US as Americans' appetites for bandwidth continue to get bigger

When Google announced its fibre project in 2010, more than 1,000 communities applied and while this is not a true expression of demand, it certainly demonstrated the level of interest. Since that time, American communities have taken steps to get better broadband, from issuing requests for proposals (RFPs) that ask private companies what they need to come and build, to streamlining permitting processes, making available previously underutilised assets like city-owned fibre, and generally working to "make the math work" to create next generation broadband networks.

Communities in the Research Triangle Park, for example, have issued regional RFPs through the North Carolina Next Generation Network (NCNGN) regional initiative that focuses on stimulating the deployment of next-generation broadband networks in North Carolina. In Mississippi, private company and FTTH Council Americas member C Spire Fiber is adhering to Google's build-to-demand approach even more closely than other providers. Communities have rallied to be the first to work with the company – which lit its first gigabit customers in late 2014 – and to aggregate demand to make it easier to build out. Dozens of communities have taken part in organised efforts like Gig.U, Next Century Cities, and the FTTH

A construction worker sets up the steerable bore head to run fibre underground in Austin, Texas

Google

Council America's regional meetings, and more than 200 applications were submitted to the Federal Communications Commission's (FCC) recently announced Rural Broadband Experiments Program.

Some believe that Google's foray into fibre is the big story, full stop. But what it actually shows is that US communities want fibre-fed ultrafast networks and are willing to organise to get them. Dozens of communities have recognised that the broadband networks they use today will not be sufficient in the years ahead, and the FTTH Council Americas has been proud to help these communities work to take control of their bandwidth destinies.

In September 2014, the FTTH Council Americas released a first-of-its-kind study — Early Evidence Suggests Gigabit Broadband Drives GDP — which looked at 55 communities in 9 American states. The 14 communities where gigabit Internet services are widely available exhibited a per capita GDP (gross domestic product) approximately 1.1% higher than the 41 similar communities which had little to no availability of gigabit services.

In dollar terms, these 14 gigabit broadband communities enjoyed approximately $1.4 billion in additional GDP when gigabit broadband became widely available. Furthermore, the study found that if the 41 communities without gigabit broadband were to adopt the new service, they could expect as much as $3.3 billion in incremental GDP.

The deployment of widespread ultra-high bandwidth broadband offers great promise for the economic future, similar to the way that access to abundant electricity transformed America, lighting up factories to produce affordable consumer goods and automobiles for transportation. Widespread gigabit availability contributes to the economy in multiple ways: investment into the physical infrastructure and labour creates jobs and increases expenditures in inputs like electronics and fibre optic cable.

The new platform provided by next generation broadband infrastructure also has the power to shift economic activity, sparking local technology scenes and the relocation of businesses. From the Hacker House in Kansas City to the Startup House in Fargo, North Dakota, local entrepreneurs are using gigabit networks to develop new applications and services, bringing in new investment and talent along the way.

"We're finally at a point with gigabit deployments where we can begin validating what we know from experience: gigabit deployments are net additive to communities," Heather Burnett Gold, President of FTTH Council Americas, commented. "We saw this with the transition from dial-up Internet to always-on broadband." Gold continued by saying that in the last several years, communities, their leaders and several private companies have made moves to stimulate and support the economy by upgrading their networks to gigabit capabilities. "They, and we, remain gigabit enthusiasts, willing to demonstrate how each citizen can help to make gigabit communities a priority," she said.

In conclusion, Gold added that the demand for broadband is being fuelled by an increase in the number of in-home devices as well as the average number of hours spent online. "Broadband take-up rates have reached a high of 45.9% in the US, and more than one third of the FTTH providers we talk to are planning to build more," said Gold. "One Wall Street analyst recently estimated that if all announced all-fibre deployments in US metro areas are executed, 50% of homes will be passed soon – and that if plans under exploration come to fruition that figure will rise to 75% of homes. I believe that 2015 will see fibre start to really take off.

"Demand for broadband is being fuelled by an increase in the number of in-home devices"

FTTH Council Americas

The FTTH Council Americas is a non-profit association consisting of companies and organisations that deliver video, Internet and/or voice services over high-bandwidth, next-generation, direct fibre optic connections, as well as companies that manufacture FTTH products and others involved in planning and building FTTH networks.

The Council works to create a cohesive group to share knowledge and build industry consensus on key issues surrounding fibre to the home. Its mission is to accelerate deployment of all-fibre access networks by demonstrating how fibre-enabled applications and solutions create value for service providers and their customers, promote economic development and enhance quality of life.

Leading the way in LATAM

In just five short years, impressive headway for FTTH has been made in Latin America

Figures for FTTH in Latin America at the end of 2013 are impressive. The year-on-year growth rate for December 2012/December 2013, for example, shows a subscriber increase of 136%, while the number of homes passed has risen by 85%, leading to a total of 10.23 million potential premises to which a service provider has capability to connect in a service area. Chile paved the way in 2009, when serious trials were undertaken by Telefónica de Chile and GTD Manquehue began small deployments.

By the end of 2013, 5% of Chilean households were homes passed, though this is not representative of effective coverage. The end of 2010 and beginning of 2011 saw serious deployment begin in Brasil, Uruguay and Mexico. The Brasil FTTH is led by Telefónica Vivo, GVT (Vivendi Group in merger negotiations now with Telefónca Vivo), and EMBRATEL (América Móvil), and 6% of households were Homes Passed at the end of 2013. In Mexico, FTTH is led by ILEC Telmex (América Móvil) and CLECs TotalPlay (TVAzteca), and AXTEL, and by the end of 2013 a total of 14% of households were Homes Passed.

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Argentina is a more complicated story. Several mini FTTH deployments by small towns and cooperatives have taken place in the country; however two large Incumbent Local Exchange Companies (ILECs) – Telefonica and Telecom – have been prevented from delivering video. This difficulty for them investing in FTTH has led to both companies going down the route of Fibre to the Node (FTTN), though things may change in 2015 due to a very recently passed Federal Law of Communications at the end of 2014. In Ecuador, ILECs are leading in terms of actual HHC (subscribers), and CNT the government ILEC is far behind in terms of HHC. Finally, Colombia demonstrated a massive

The chaotic growth of aerial distribution communication networks in Quito, Ecuador, has led to the development of underground networks

By the end of 2013, 5% of Chilean households were homes passed

commitment by Bogotás government ILEC, ETB, with the commercial launch of FTTH in December 2013.

Described as The Jewel of The River Plate, the success story within Latin America is undoubtedly Uruguay. In 2010, President José (Pepe) Mujica empowered the national carrier, ANTEL, to start engineering and deployment of FTTH to every citizen in Uruguay. This was done in line with several major country development programs in education, health, rural inclusion, population safety, etc. In April 2012, the FTTH Council Americas-LATAM Chapter President delivered the first FTTH PON DESIGN Training and Certification official programme in Montevideo, the capital city of Uruguay, to 50 ANTEL technicians and engineers, as well as several University professors and tuition assistants, spreading the FTTH Best Practices knowledge efforts within ANTEL. At the end of 2013, an impressive 63% of households were Homes Passed.

Although it's a small country of roughly 3.5 million people, Uruguay leads the way in LATAM, and the president of ANTEL, Ing Carolina Cosse, along with the company she leads have been awarded with either the FTTH LATAM Profesional del Año Award or the FTTH LATAM Carrier del Año Award, for 3 consecutive years. ANTEL has also recently provided safe rugged superfast broadband connectivity via fibre to the Uruguayan Air Force radars to improve Uruguay´s Air space management and air traffic guidance. In addition, ANTEL in conjunction with the Engineering College (Fing) of the Universidad de La República, Uruguay, launched their first satellite in June 2014 which was entirely developed and made in Uruguay. Although it is a basic telemetry satellite, ANTELSAT has already been sending back basic raw information that can have applications in meteorology and agriculture in Uruguay.

According to IDATE, in June 2014 there were upwards of 400,000 FTTH subscribers in Uruguay, which amounts to a subscriber/homes ratio of more than 40%. The growth in this region has been substantial, and has led to Uruguay not only being the first country in Latin America to enter the Global FTTH Rankings – the annual IDATE ranking which tracks global deployment of fibre networks – but it has done so within the Top 7.

Other countries in the region that lag behind, but that have started experimenting with FTTH and considering it as a broadband platform for the near future, are Perú, Venezuela, and Costa Rica. In addition, a country generating great expectations in FTTH new deployments for 2015 is Bolivia, with ENTEL, the National carrier, starting its FTTH networks across the country for the first time in 2015, and COMTECO in Cochabamba and COTAS in Santa Cruz expanding their already existing fibre access services!

"The success story within Latin America is undoubtedly Uruguay"

LATAM Chapter

The FTTH Council Americas-LATAM Chapter was founded in April 2009 by just nine vendor companies. Since that time, it has grown to include 66 Latin American members – 38% of which are carriers who have access to the knowledge, experience and best practices that have evolved on a global scale through all five International councils that form the FTTH Council's Global Alliance (FCGA).

FTTH in Latin America is certainly developing, and doing so at a steady rate. The FTTH LATAM chapter has produced several technical documents and training courses with certification at the request of its carrier members, and more than 500 technicians and engineers have been certified by the FTTH LATAM Chapter Master Instructors.

MENA's mission

With a rate of 70% FTTH subscribers/homes passed, the United Arab Emirates leads the way in fibre connectivity

Fibre to the Home Council Middle East & North Africa

FTTH MENA

The FTTH Council Middle East and North Africa is an industry organisation with a mission to accelerate FTTH adoption by all broadband stakeholders through information and promotion, in order to accelerate the availability of fibre-based, ultra-high-speed access networks to consumers and businesses. The Council promotes FTTH because it delivers a flow of new services that enhances the quality of life, contributes to a better environment and boosts competitiveness.

The vision of Sheikh Mohammed bin Rashid Al Maktoum is to transform Dubai into a smart and global city with a mature information and communications technology (ICT) infrastructure at its core. With that in mind, the government in the United Arab Emirates (UAE) has focused on the delivery of digital services such as: e-commerce, e-government, e-solutions, e-education and e-health.

Such a mission requires a number of infrastructure capabilities to connect all homes and businesses. There is, for example, the need for higher bandwidth beyond the limitations of present copper and wireless technologies. Services also need to be reliable, and fibre has a much longer lifespan than copper in hot and humid environments. A single network for business, consumer and mobile backhaul will result in a simplified infrastructure, whilst lower capital expenditures (CAPEX) and operational expenditure (OPEX) encourage operator investment.

The Fibre to the Home (FTTH) initiative is having an impact and currently there is rate of 70% FTTH subscribers/homes passed in the UAE, with 97% of the land in Dubai being covered by fibre. In addition to bundled triple play services and e-life services from Etisalat, a telecommunication services and technology company headquartered in the UAE, new services and applications are being developed under the

97% of the land in Dubai is covered by fibre

mohamed alwerdany/Shutterstock.com

Promoting FTTH across MENA

Although progress is being made on FTTH deployments in several Middle East and North Africa (MENA) region countries, there is much to be done in many others. The FTTH Council MENA is determined to carry on its mission to encourage and promote faster FTTH deployments across the MENA region

The concept of a national broadband network (NBN) has been developed by governments around the world who are continuously examining the status of their infrastructure, assessing the sector and deciding whether existing networks need to be modernised or extended. This process of examination has given rise to the concept of an open fibre broadband network stimulated by government.

As part of its Regulatory and Policy Committee's mission, the FTTH Council MENA is committed to strengthening its cooperation with policy makers, governments and regulators in the region through specific studies in order to positively influence relevant NBN policy development and have a positive impact on broadband deployment in general, and FTTH rollout in particular.

"With more than 50 members and its four committees since its inception in 2011 by its founding members Moseco, Prysmian, Alcatel-Lucent, MEFC and Cisco, FTTH Council MENA witnessed another successful year during 2014 with several achievements to promote the FTTH deployment in the MENA region thanks to the continuous support of its board of directors," stated Dr Suleiman Al-Hedaithy, Chairman of the board.

Dr Al-Hedaithy added: "Creating a sustainable future is not just about protecting the environment; it is also about wider benefits to society and its citizens, and the economic health of communities and nations. FTTH has a positive impact on all three of these areas."

smart cities initiatives. These include smart transport and energy with respect to the necessary elements of a smart city that are sustained by having an infrastructure based on fibre technology. This will definitely have a positive impact on the way people of UAE live, and the way they interact with the smart environment around them.

Smart services will enable a more efficient use of energy, reduce the traffic and time to commute, lead to less pollution, and provide more efficient and convenient government services, etc. With a mature fibre ICT infrastructure and a national broadband network in place, national economic development and growth is secured. FTTH will always lead the way in digital transformation that enhances the life of the community.

During the next 12 months in the UAE, a quantum leap to 1 Gbps is expected. The challenge for developers will be to deliver that Internet speed to every household, whilst maintaining commercial success. More importantly, once the fixed infrastructure sharing is agreed on by operators and approved by the Telecommunications Regulatory Authority (a step that had not been completed at the time of publishing), the FTTH Council MENA expects to see a change in the UAE telecom market dynamics. Both the incumbent operator Etisalat and the alternative operator Du will share each other's network. By sharing one of the most advanced fibre-based broadband networks with almost 100% FTTH coverage, operators will compete on providing smart services and content with improved customer service.

Main trends in MENA's FTTH/B market

UAE is the main FTTH/B market with more than 1 million FTTH/B subscribers, and with a market share of 73%, telecommunication services and technology company Etisalat dominates the region. UAE has a good penetration rate (subscribers/ homes passed) of 67%. Saudi Arabia has more than 481,500 FTTH/B subscribers, with a growth of 71% between September 2013 and September 2014. The largest provider in this region is STC, which has a market share of 70% and the largest coverage. In Qatar, the FTTH/B market is growing (190,500 FTTH/B subscribers), and national coverage was achieved in 2014 by incumbent Ooredoo (Qtel).

In September 2014, there were a total of 1,716,280 FTTH/B subscribers in the MENA region, and 4,140,600 FTTH/B homes passed. In terms of year-on-year growth, subscribers were up by 33.2% and homes passed increased by 355%. These figures were calculated by comparing the 11 countries analysed in the FTTH MENA Panorama 2014 – an annual study by FTTH Council MENA and IDATE – to the 19 countries analysed in the 2013 report.

Spreading the FTTH message

FTTH COUNCIL ASIA PACIFIC | FIBER TO THE HOME APAC

The FTTH Council Asia-Pacific is promoting the benefits of fiber through a wealth of seminars, workshops and partner events

On 29 September 2014, the FTTH Council Asia-Pacific's Australia Workshop 2014 began in Melbourne, Australia, with a welcome address from Council President, Dr Bernard Lee. Among the noted speakers was Graham Mitchell, CEO of New Zealand-based Crown Fibre Holdings, who presented an update on the region's Ultra-Fast Broadband (UFB) initiative. Mitchell commented that the deployment plans for 2015 included 48% project completion, 34% population coverage, 97% school coverage, and 91% business coverage.

At the time of the presentation, the figures stood at 38% project completion, which amounts to 517,000 end users (e.g. households, businesses) able to connect; 26% population coverage; 93% school coverage; and 77% business coverage. Deployment costs are reducing as the build gains momentum, and Mitchell believes that UFB is already having a positive impact on New Zealand. UFB deployment is making good progress and is expected to meet the 2015 targets.

Also speaking at the event, Dr Craig Watkins of Spiral Systems Pty presented an overview of FTT-Street-Lead-In-Pit (FTTdp), and asked whether this is a pragmatic approach faithful to the FTTH vision. FTTdp offers the same benefits as Fiber to the Home (FTTH), but at a lower customer connection cost due to the use of small micro-node devices installed in street lead-in pits. Watkins explained that FTTH provides solid network capability, but is expensive at $3260 per brownfield premises. FTTN (Fiber to the Node) is cheaper, but provides 100/40 Mbps at best, and perhaps 25/5 at extremities.

The overall scope for cost reduction is substantial by exploiting copper lead-in, but effective network capability is retained with the FTTdp approach. Bottom line difference also depends on deployment time (revenue), and in this sense FTT-Street-Pit may compare favourably (subject to clever architecture decisions). Watkins added that on a long-term, total cost of ownership basis, FTT-Street-Pit is a more obvious choice, but it may also be a prime choice based on up-front costs (proper analysis is required). In aerial distribution areas, however, it is likely that fiber drop installation will be more economical.

Others speakers included Dr Bernard Lee from Senko Advanced Components, Tony Conlan from JDSU, Bill Kotsakidis from Warren & Brown Technologies, Shajahan Iqbal, Treasurer and Director FTTH Council Asia-Pacific, and Wataru Katsurashima from Sumitomo Electric Industries.

In Taj Samudra, Colombo, the FTTH Council Asia-Pacific Sri Lanka Workshop took place on 29 April 2014. During his presentation, 'SLT Experience on FTTH', Tilak De Silva, Chief Innovation Officer at Sri Lanka Telecom, asked whether the investment in fiber will eventually pay for itself. His response was that, initially, the service can be provided by using dark fibers, and that once demand increases, structured cabling can be done. He added that when the FTTH is provided, bandwidth for the next 10 years can be catered for, and that more bandwidth-hungry applications/contents can and will be introduced. De Silva concluded by saying that while the industry cannot currently charge more for existing services, more revenue can be expected in the long-term without any further investment.

V. K. Balasundara, Chief Executive Officer at 3OPP Lanka, highlighted why he believes FTTH/B (Fiber to the Home or Building) is a global requirement for both residences and businesses. Among his reasons was the fact that to manage the day-to-day life activity of the general public and businesses requires higher and constant speed connectivity. In addition, FTTH can contribute to a reduction in the economic risk in the telecom industry; can contribute to solving the world's energy crisis; and is the best method for a low cost, stable high bandwidth connection. He added that there are multiple ways of deploying FTTH, and that different design options for outside plant can significantly impact costs and network functionality.

India Seminar 2014

Events

In 2014, the FTTH Council Asia-Pacific was involved in a number of partner events. They were as follows:

- Alliance with **Convergence India 2014** held on 21-23 January 2014;
- Associate Partner of 4G **World India 2014**, which took place on 24-25 April 2014 at Gurgaon, India;
- Represented at the **Brunei Seminar** which took place on 17 May 2014. Dr Bernard Lee delivered a presentation and moderated a panel session on behalf of FTTH Council Asia-Pacific;
- Supporting organization at the **CommunicAsia 2014** held on 17-20 June 2014 in Singapore;
- Partner event at the **Myanmar Connect 2014**, which was held on 16-17 September 2014;
- Strategic partner of **Next Generation Packet Transport Networks India 2014**, which took place on 23 September 2014 at Gurgaon, India.

Further presentations included 'Field Assembly Connector Application in FTTx Network' by Wataru Katsurashima, Sumitomo Electric Industries; 'Requirements of access network convergence' by Mohamed Shajahan bin Iqbal and V. K. Balasundara from 3OPP; 'Installation of cable into duct' by Michael van Moppes, Plumettaz Singapore Ltd. Further speakers included Alexis Bernardino, Chief Technology Strategist, Converge ICT Philippines.

In addition to its workshop programs, the FTTH Council Asia-Pacific hosted India Seminar 2014 on fiber for convergence, which took place on 23 January 2014 in New Delhi, India. In his welcome speech, the Council's Director Anil Pande highlighted that by year-end 2012, Asia-Pacific had 79 million FTTH/B subscribers, compared to 272.5 million wireline broadband subscribers, with a predicted growth that will see it rival DSL in 2016. India is forecast to exceed 7 million FTTH/B subscribers within that year. China is predicted to exceed 82 million FTTH/B subscribers by 2016, while the meaningful FTTH/B subscriber bases seen in Japan and South Korea in 2008 are expected to translate into future growth.

Pande added that, as early adopters of FTTH/B, Taiwan and Hong Kong will continue to demonstrate growth, while Malaysia has shown rapid growth from a small base. Although Australia was a late starter, steep growth is forecast with NBN plan implementation, while the deployments in Singapore are expected to lead to a high growth rate from 2012 to 2016. Both Indonesia and New Zealand should show a very high growth rate from 2012 to 2016, and the rest of Asia-Pacific countries are predicted to continue to exhibit growth between 2012 and 2016. By year-end 2016, Pande presented, nine economies are forecast to reach FTTH/B household penetration rates of 20% or higher: Hong Kong, South Korea, Singapore, Japan, Taiwan, New Zealand, China, Malaysia and Australia.

Other speakers at the event included N. Ravi Shanker, Chairman, Bharat Broadband Network Limited; Dr Kumar N Sivarajan, Tejas; Bhupendra Rane, TE Connectivity; Anuj Jain, PWC; Vipin Tyagi, C-DOT; Roland Montagne, IDATE; Anish Sharma, ZTE; Bipul Singh, Corning; and Kuldeep Goyal. ●

Journey to Jakarta

Taking place 19-21 May 2015 in Jakarta, Indonesia, the FTTH Council Asia-Pacific Conference and Exhibition 2015 will gather Asia's leading experts in Fiber to the Home

This year marks the 10th anniversary of the FTTH Council Asia-Pacific, which together with the Asia-Pacific region reaching the 100 million connectivity milestone, means that the 2015 event will serve as a double celebration for the FTTH Council Asia-Pacific and for the industry!

The 100 million connectivity milestone is a great achievement for the region, but some countries are still waiting to gain ground. The conference will investigate what we can learn from those countries leading the way, how we can reach the next 100 million connections, and what the industry may look like in the future. Around 50 leading industry figures will offer their experience, knowledge and insight on where the FTTH industry is heading in the Asia-Pacific region.

More than 500 delegates, from more than 40 countries and representing hundreds of companies, are expected at the event which has been designed to be informative and interactive through panel discussions, interviews and round tables. Each afternoon will be split into two streams to give delegates more flexibility and opportunities for learning. The use of case studies will offer real life examples from Asia and the rest of the world.

Networking remains a key element of the event, and many opportunities will be provided for delegates to meet associates, conduct business and have fun in a relaxed atmosphere. In addition to a pre-event golf day, entertainment will be provided in the evenings and will include a charity raffle. The FTTH Council Asia-Pacific Conference and Exhibition 2015 will be the ideal platform for operators and vendors to meet, do business and learn about the latest innovations and strategies driving FTTH connectivity in Asia-Pacific and beyond. ●

For more information about the Jakarta Annual Conference, please visit www.ftthconferenceapac.com

Professionals flock to Penang

Under the banner of 'See the Light', the Penang Annual Conference offered an inspirational view of fiber in Asia

In June 2014, more than 300 delegates attended the 9th FTTH Council Asia-Pacific Conference and Exhibition in Penang, Malaysia, to gain insight into Fiber to the Home (FTTH) development, technologies, innovation, and the market trends that surround Fiber to the Home in Asia. During the three-day conference, the theme of 'return on quality' (ROQ) received a considerable amount of attention as the benefits of taking a 'right first time' approach to migration to fibre ensures lower costs down-stream, and improves the opportunities for future growth.

Following a very insightful opening speech by Datuk Mohd Rashid Hasnon, Deputy Chief Minister of Penang State, delegates representing Asia's leading telecom operators, government representatives, FTTH vendors and equipment manufacturers, were offered the full 360-degree view of FTTH deployment in Malaysia, including Penang.

Among the many notable speakers who voiced their opinions and offered unique insights during the conference was Dr Farid Sani of Telecom Malaysia (TM), who revealed that more than 1.5 million premises in the region have now been passed for high-speed broadband deployment. In 2008, the Malaysian government began a public-private partnership with TM to drive forward high-speed broadband, and within three years 1.3m ports were deployed in record time. In his presentation 'Highspeed Nation', Sani added that as of Q1 2014, household broadband penetration had reached 67.3% – one of the highest figures in the region.

In Indonesia, broadband connectivity represents a significant challenge. In his presentation 'Challenges For Fiber Deployment in Emerging Markets: What Lessons Are Being Learnt?' Arief Mustain of PT Telekomunikasi Indonesia highlighted that Indonesia is globally ranked at 109 for average peak connection speed. During Q2 2013, the peak Mbps was 11.3 compared to Hong Kong's 65.1 Mbps and the global average of 18.9 Mbps (source: Akamai Technologies, 2013). In addition, there is a wide disparity in information and communications technology (ICT) between the Western and Eastern regions.

Mustain sites that 80% of the ICT infrastructure and 82% of internet service providers (ISP) are concentrated in the West side (source: Renstra Kominfo 2010-2014). However, the IDN (Indonesia Digital Network) 2015 programme, as discussed by Revolin Simulsyah of PT Telekomunikasi Indonesia, aims to focus on solid infrastructure deployment to accelerate Indonesia's broadband service penetration and economic advancement, in line with the government's Masterplan for Indonesia Digital Network Acceleration & Expansion of Indonesian Economic Development (MP3EI).

Moving beyond regional views, another of the interesting topics discussed at the conference was LTE (Long-Term Evolution), a wireless communication standard for high-speed data for mobile phones and data terminals. Telecom Malaysia's Dr Farid Sani commented that the rise of connected homes, smart devices, cloud, OTT and the Internet of Things will fuel the demand for FTTH in the homes and LTE for mobility. He added that a converged offering is most likely to benefit telecommunications companies and consumers – offering flexibility in deployment and meeting consumer needs, while being technology agnostic. Wei Leping of China Telecom Corporation echoed the view of harmony between FTTH and LTE. In his presentation, 'FTTH vs LTE', Leping explained that FTTH will focus on cities and developed regions while LTE will cover the whole country in a few years. In terms of applications, FTTH will focus on bandwidth hungry applications such as high-definition television (HDTV) in the home, and LTE will focus on fragmented video and low/middle speed data that can be accessed anywhere. Finally, FTTH is based on a monthly package and will focus on 20 Mbps or above. Based on tiered traffic, LTE will focus on 10 Mbps or below. ●

> **"Household broadband penetration has reached 67.3% in Malaysia"**

Penang Annual Conference 2014

Meet the leadership team

The FTTH Council Asia-Pacific's new Board of Directors offer their personal perspectives on FTTH 2.0

Dr Bernard Lee,
President,
FTTH Council Asia-Pacific

"The bandwidth and applications currently carried over the FTTH network are just the tip of the iceberg – the larger potential still awaits. Next-generation PON 1 (NG-PON1), which caters for speeds of 10 Gbps, has been standardised and is currently being commercially deployed in a few countries in APAC. NG-PON2, which offers speed of up to 40 Gbps and 100 Gbps, is still undergoing development but we expect to see it being commercially deployed before the turn of the decade. Ultimately, the era of FTTH 2.0 will be the era of awakening the true technological and commercial potential of the FTTH's Fiber network."

Alexis Bernardino,
Vice President,
FTTH Council Asia-Pacific

"FTTH 2.0 is the next era of the FTTH journey expanding and broadening the horizon of what was really the intended end state of FTTH five years ago. It now goes beyond delivering the Fiber access straight to the home and redefines itself as Fiber going to anywhere. Furthermore, to add value and business relevance to the adaptation to FTTH, it's not just laying the physical Fiber anymore to provide basic high-speed connectivity access, but rather putting on top applications, solutions and services that will consume the huge bandwidth in between. With its high capacity nature, as long as the pipe is large enough, anything could run on this future-proof infrastructure."

Wataru Katsurashima,
Secretary and Director,
FTTH Council Asia-Pacific

"While FTTH 2.0 is the important theme for the Asia-Pacific region where some countries have deployed the ultra-fast Internet nationwide, FTTH 1.0 for the under-served areas is still important. FTTH Council APAC will continue to establish FTTH training and education schemes, as well as proposing emblem schemes in the areas where FTTx adds value. FTTx network, or having the Fiber as close to the customers as possible, is also important for 4G/5G migration in the future and if the operators have good coverage of FTTx, they will save the money to establish mobile front haul in the future. Starting up FTTH 2.0 activity doesn't mean the end of FTTH 1.0 promotion."

Mohamed Shajahan Iqbal,
Treasurer and Director,
FTTH Council Asia-Pacific

"The vision of the FTTH Council APAC is to create an awareness of the importance of deploying Fiber to home networks, Fiber to the premises, and Fiber to node, and to bring about new digital age applications. It is important to note that FTTH 2.0 stands for attracting cloud and application content development. Secondly, it aims to develop capacity building in underserved regions; i.e., Thailand, Sri Lanka, Vietnam and the Philippines. Thirdly, it facilitates the use of the FC Global Alliance, and the sharing of technology, standards and best practice experiences to create a knowledge base that can help create and expedite savings from optimal deployment strategies, tools, products and roll-out methodology."

Zony Chen,
Director,
FTTH Council Asia-Pacific

"I view FTTH 1.0 as the first generation of physical connections that brought Fiber to people's homes. However, like all v1.0s, the technology, design and hardware, while functional, can be further optimised. This is where FTTH 2.0 comes in. Improved network architectures, product features, and installation techniques enable even faster service turn up and guarantee higher levels of quality of service. Also part of FTTH 2.0 is the development of innovative services and applications to enable new revenue streams."

Xingfu He,
Director,
FTTH Council Asia-Pacific

"At its core, FTTH 2.0 represents the focus of Fiber to the Home on new applications and solutions that are now possible through the FTTH infrastructure that has been put into place. Those countries that have a long FTTH adoption history can now be considered to be FTTH 2.0-enabled as their focus has shifted from rollouts of the basic technology, to the applications and services that had previously been dismissed due to technological constraints, but that have now been enabled through FTTH (FTTH 2.0)."

Kiana Shek,
Director,
FTTH Council Asia-Pacific

"On average, Hong Kong has the fastest broadband services in the world and as we enter the era of FTTH 2.0 we will see the creation of many more start-up businesses. The Wi-Fi based on the fiber network infrastructure in Hong Kong is faster than the mainline in many other countries, and this will enable small businesses to remove expensive property set up/opex costs and manage much of their administration – from emails to banking – via cloud services. This will ultimately open up a great deal of business potential in the region and enable people to lead better and more flexible lives – and make HK a better place to live, which is HKBN's core purpose."

H. Munasir Choudhury,
Director General,
FTTH Council Asia-Pacific

"The advancement of Fiber to the Home (FTTH) technology over the years has now made it a popular choice for deployment in regions across the globe. This is very much a mature technology that is designed to address the necessity of future-proof broadband services. While many countries are starting to adopt FTTH, there are others that are leading the way by having already completed FTTH deployment (FTTH 1.0) and now have strong focus on applications and services that have been enabled through FTTH (FTTH 2.0)."

Customers in Hong Kong can enjoy high capacity fiber broadband connections

Ronnie Chua/Shutterstock.com

Boosting business

FTTH is changing the lives of consumers in Hong Kong

William Yeung, HKBN's CEO and co-owner

> "There are approximately two million broadband-connected households, and more than half enjoy FTTH services"

FTTH had existed in Hong Kong for around 10 years, when carrier Hong Kong Broadband Network (HKBN) rolled out its first 1G FTTH residential service in 2005. HKBN's CEO and co-owner William Yeung said: "FTTH is now well accepted by customers in Hong Kong. There are approximately two million broadband-connected households – representing 83% of the population – and more than half of those connected currently enjoy FTTH services."

With no government strategy or financing in place for FTTH in Hong Kong, the network is entirely privately funded and provided by HKBN and its commercial competitors. "The arrival of FTTH changed the lives of consumers in Hong Kong," commented Yeung. "Now, they have a broadband connection capable of supporting multiple devices over a home Wi-Fi network offering 50 to 80 Mbps. A traditional ADSL line would only be able to offer 6 to 8 Mbps. The bigger pipe supports the use of more simultaneous devices, even with high capacity content consumption.

"There has also been a positive impact on home-based businesses, particularly with the advent of cloud-based services, where FTTH has made it easy to carry out high-bandwidth business activities from home."

Being a densely populated city, the rollout of the fiber network has been achieved relatively cheaply. "We have many high-rise buildings; each has an average of 40 storeys, and each floor can have more than 10 dwellings," said Yeung. "That means we can reach a lot of people quickly and efficiently. Our infrastructure cost per household is around US$220, which is around a tenth of the cost of the US and Europe.

"However, it is difficult for new entrants. Many of these buildings are more than 30 years old, and the interior design and existing trunking does not allow for multiple cables to be fed into and throughout the building. This means that a single building often has no more than two – or possibly three – competing providers, because there is no physical capacity to [have more]."

The concept of FTTH 2.0 is in its infancy in Hong Kong, but according to Yeung, HKBN is already at the harvesting stage, placing it ahead of its competitors in that regard. "We are already bringing overseas content," he continued. "There is also no bottleneck in the last mile with a fiber network, so the advent of FTTH 2.0 will stimulate new applications and monetise the capabilities of this larger capacity network."

"Customers in Hong Kong can now enjoy high value, high capacity fiber broadband connections at a fraction of the cost of those in the US and Europe. We are able to deliver fast and stable access to content that is rising exponentially in terms of bandwidth demands, both from Hong Kong and overseas at a cost of around $22/month for 100 Mbps." ●

FTTH introduction in Japan

Hiromichi Shinohara, Representative Director and Senior Executive Vice President, CTO at Nippon Telegraph and Telephone Corporation (NTT), offers his view of FTTH in Japan

In January 1994, NTT revealed its 'Basic Concept for the Coming Multimedia Age' in response to the fact that the infocommunications industries had reached a turning point in terms of engineering innovation and diversification of user demands. In June that year, the Ministry of Posts and Telecommunications (now the Ministry of Internal Affairs and Communications) concluded that optical fibers would need to be introduced into the access network in order to realise the concept of a 'multimedia society'.

In the 'NTT R&D towards 21st century' report submitted in 1996, the company declared that it would realise 10 Mbps with the cost of roughly JPY10,000 per month, and so its R&D staff began developing products and technologies to enable a FTTH service to be provided at that cost. The first step in the company's business deployment plan saw NTT collaborate, in July 1997, with a local cable provider in the Totsuka area of Yokohama city in order to introduce a commercial Fiber to the Home (FTTH) service that delivered both a voice/data service and video through fiber.

Three years later, in December 2000, NTT East and West commenced a high-speed Internet service in Tokyo and Osaka, with a maximum speed of 10 Mbps. Finally – and under the banner 'B-flets' – NTT East and West expanded the FTTH service across the country in August 2001. That year, NTT initiated the large scale deployment of commercial FTTH. Furthermore, in the updated report on 'Optical Fibre Deployment into Access Network', the company set itself a nationwide target of replacing the copper access network with optical fibre by 2010.

National strategies

The government set up an IT Strategy Headquarters and presented its 'e-Japan Strategy', which mostly weighed the importance of realising ultra-high-speed networks in order to maximise the benefit to the user through fair competition. To promote that competition, the government introduced the asymmetric regulation, while discussions regarding ULL fiber occurred repeatedly within public and private companies. From this, a strategy was developed that took elements from several e-Japan programme updates and u-Japan policies which focus more on the application of information and communication technology (ICT) rather than the construction of the network.

On the other hand, while the telecoms developed their optical access network in big cities, the digital divide – or zero-broadband area – had risen to the surface in rural areas. In August 2006, the Ministry of Internal Affairs and Communications presented new 'Strategies of next generation broadband 2010', in which it declared to resolve the issue of the digital divide. The government set the guidance and target of realising the advanced network society; however the realisation of the real-scale deployment was achieved by the private sectors under the fair competition rules. It first began in big cities before moving into rural areas, and now NTT is focusing on the application of ICT.

Hiromichi Shinohara

> **"Undoubtedly, the biggest challenge has been one of cost reduction"**

The main challenges

Undoubtedly, the biggest challenge has been one of cost reduction. It was inevitable that there would be the same level of construction cost for fiber as there was for the copper line. The difficulty in handling optical fibres presented another challenge, and NTT needed to find new methods of facilitating the introduction of fibres into premises as easily as we had previously introduced copper. In addition, NTT needed to respond customer requests for fiber to be introduced quickly.

These tasks were achieved through the introduction of the effective PON system and the new multi-fibre-count cable, which enabled the cost to be shared among users. Furthermore, NTT's R&D team developed an effective installation method, introduced the bending insensitive fibre, and have continually improved the operational system to choose the best access point and equipment. This served to shorten the lead-time after the request of service.

As of the end of March 2014, the coverage of FTTH in Japan is 95% in the NTT East territory and 92% in NTT West territory. And the cost per Mbps is one of the lowest in the world. The number of FTTH users in NTT exceeded 18 million in 2014. We believe we have already established a network that enables users to enjoy an inexpensive yet high-speed telecommunications service. In this environment, ICT is more than just delivering voice, data and video – which was the main focus in the past – and as a result we see changes in our lifestyle and business methods, such as within healthcare, education, agriculture, entertainment, logistics and government.

These changes have just begun, and they are not enough; however we believe that the social challenges such as a super-aging society, concentration in cities, and natural disasters will be eased and might be resolved with the ubiquitous network around nations. It is not that NTT by itself proposes the solutions, but NTT must collaborate with various players to apply their ingenuity at solving these issues. As a further step, NTT has just implemented the 'Hikari (optical) collaboration model' in which the company wholesales the FTTH network service to partners in order to enhance the value of the network service. ●

Fiber to the Home hits 100 million milestone

In South Korea, FTTH household penetration exceeded 50% in 2013

Sean Pavone/Shutterstock.com

An incredible 100 million people in the Asia-Pacific region are now subscribed to Fiber to the Home (FTTH) services

The latest statistics from international business intelligence analysts Ovum have confirmed that a major milestone has been reached in the Asia-Pacific region. The FTTH Council Asia-Pacific, which promotes and encourages the adoption of fiber technologies, has been working to boost the number of FTTH subscribers, and its latest achievement has come ahead of its 10-year anniversary in 2015. Work by the Council, including the sharing of accurate and unbiased information about regulatory policies, standards and best practice, is credited as contributing to the successful take up of FTTH services in the region. In addition, the Council works directly with network operators to ensure they have the confidence and resources to deploy FTTH.

"This achievement is the result of hard work carried out by all Council parties, especially the board of directors who have gone beyond the call of duty in order to promote FTTH and the great benefits it can bring," commented President of the FTTH Council Asia-Pacific, Dr Bernard Lee. "When network operators in Asia-Pacific deploy FTTH they know that they will always have the FTTH Council (Asia-Pacific) standing by and we are extremely proud to have played a part in reaching such a significant milestone."

"Reaching the goal of 100 million FTTH subscribers demonstrates the success that can come from having a clear strategy in place"

While FTTH deployments are well underway in several countries, in others the year-over-year growth has slowed significantly. And in other countries FTTH remains in its infancy with very few, if any, deployments. As of 2013, South Korea, Hong Kong and Japan are the only countries where FTTH household penetration has exceeded 50%, and in many countries, including Thailand, Indonesia, India and Pakistan, that figure is close to 0%. The challenges here are well known; namely a lack of a good business case, harmful government regulations, and the fact that service providers can achieve a better return on investment elsewhere. While many governments and operators agree that FTTH will be "future-proof", it is viewed as just too expensive. However, reaching the goal of 100 million FTTH subscribers has demonstrated the success that can come from having a clear strategy in place.

Julie Kunstler, Principal Analyst at Ovum, explained that Asia-Pacific is leading the world in FTTH subscribers and that this major milestone represents a tremendous financial investment and a strong understanding of the future of networking infrastructure. "This region reflects a wide range of deployment models – from strong government goals to innovative wholesale-retail models to crossing the digital divide with support for e-health and e-education in rural regions. In addition this major milestone was achieved through innovative solutions from fiber cabling suppliers along with component and equipment vendors," she said. ●

The Ultra-Fast Broadband challenge

Graham Mitchell, CEO of Crown Fibre Holdings, discusses the New Zealand broadband landscape

Crown Fibre Holdings (CFH) was created to manage the Government's investment in the Ultra-Fast Broadband (UFB) initiative. It aims to deliver Fibre to the Premises (FTTP) to 75% of the population of New Zealand by December 2019. The Government created a public-private partnership model with a $1.35bn (USD 1.1bn) investment to deliver FTTP, offering a standard residential product of 100/50 Mbps and greater speeds for business. It required providers of wholesale (access) and retail (services) to be structurally separate, with funding directed towards open-access fibre infrastructure.

In managing the investment, CFH has overseen selection and contracts with four private sector partners that were agreed in 2010-11. CFH invests on a set funding level per premise passed, under two models. One model is investment in a Joint Venture Company (the Local Fibre Company) through share capital. The private partner has access to 100% dividends for the first 10 years then all shares convert and CFH can exit through sale or receive dividends. The second model is where CFH loans funds, interest free, to its private sector partner with redemptions at fixed dates post 10 years.

In New Zealand, UFB is broadband at a minimum speed of 100 Mbps downstream and 50 Mbps upstream. This is capable of being upgraded to 1 Gbps in the future. Mass market services are offered over gigabit-capable passive optical networks (GPON); point-to-point Layer 2 and Layer 1 services are available for larger businesses and carriers. In the period up to December 2015, the goal is to deliver UFB to priority broadband users such as businesses, schools and health services, plus green field developments and certain tranches of residential areas.

Under the UFB policy, the Government contributes towards the cost of the communal Layer One FTTP infrastructure (essentially fibre down the street to the private property boundary) and the private sector partners fund the connections to the customer from communal infrastructure, the Layer 2 electronics and operations. In 2012, Alcatel Lucent's research arm, Bell Labs, undertook economic modelling which suggested that the impact of UFB and its sister programme, the Rural Broadband Initiative (RBI), would together increase GDP by NZD $5.5bn, or 13% over 20 years (the RBI is a wireless and fibre-to-the-node initiative to 20% of the New Zealand population). It went on to calculate that the economic benefits to end users of the applications running over the infrastructure would amount to NZD $32.8bn.

Graham Mitchell

> **"In New Zealand, UFB is broadband at a minimum speed of 100 Mbps downstream and 50 Mbps upstream"**

In terms of UFB deployment, the region has a number of unique qualities, such as low population density – most New Zealanders live in detached dwellings with, on average, 20 metre frontages, so there's a need to cover a lot of distance for a few customers. Partners have to manage many different local territory authorities with different consenting and permission-to-work standards, and mobilising work forces simultaneously across the nation in many cities/towns can present a challenge. In addition, there is a lack of existing conduit to utilise for fibre and insufficient aerial plants.

Despite these challenges, the CFH build is ahead of target, with 40% of the project complete. New Zealand is the fastest in the Organisation for Economic Co-operation and Development (OECD) in terms of fibre coverage growth. Three population centres including the city of Whangarei have already been completed. The project is ahead of its deployment targets and the vast majority of towns and cities will have UFB fully rolled out by 2018.

Uptake nationally stands at more than 10%, and strong growth in orders suggests overall demand will be far greater. More than 93% of schools and more than three-quarters of businesses have been passed by fibre and are able to connect. All the local telecommunications retailers are now selling UFB, and fibre entry-level plans are priced similar to ADSL plans at retail, with 100Mbps fibre plans at about +NZD $10/month more than ADSL.

The wholesale partners have developed new wholesale products (for example 200 Mbps, 1 Gbps) and have lowered some wholesale prices. New services are beginning to emerge from retail service providers such as Over-The-Top Internet TV and triple-play pay TV delivered over UFB. Netflix is also expected to launch in New Zealand in 2015.

The New Zealand Government has recently announced that it intends to increase the UFB initiative to reach 80% of the population. Further details are expected in the coming year on the extension of the UFB and RBI initiatives as the New Zealand government looks to make high speed connectivity even more widely available across the country. As CFH moves into this next phase, it would like to acknowledge the work of its four partners to date. Whether designing the network, digging trenches, managing funds or providing customer service, this is a significant project which has a professional and committed team delivering it. ●

Making the connection

The Indian government has very ambitious plans for broadband connectivity in the region, as BBNL's P.K.Agarwal explains

In order to facilitate the growth of broadband in India, the government has set a target of connecting each of the 250,000 Gram Panchayats (rural local governments spread across the country) to the block point of presence (PoP). Part of the Digital India program, this plan involves using the existing fiber network by laying incremental optical fiber cable, estimated to be around 2.4 km per Gram Panchayat (GP). The hope is that this new network will bridge the digital divide and deliver services to rural areas. Bharat Broadband Network Limited (BBNL), a government of India undertaking, is the implementation agency for the National Optical Fiber Network (NOFN)

The entire project has been funded by the government of India through the Universal Service Obligation Fund (USOF), and state governments are expected to contribute by not levying any right of way charges. BBNL will ensure that at least 100 Mbps bandwidth is available at each Village Panchayat and non-discriminatory access is provided to all categories of service providers.

> **"BBNL will ensure that at least 100 Mbps bandwidth is available at each Village Panchayat and non-discriminatory access is provided to all categories of service providers"**

To achieve this, BBNL will be laying incremental optical fiber cable between the block and GP. For example, cable at almost 3 Kms per GP will be leveraging the existing fiber of three central public sector units (CPSUs); namely BSNL, Railtel, and PGCIL, and the core network. This will not only minimise the cost, but the target of reaching GPs will be achieved in the least possible amount of time. Under the Digital India program, the target date for completing the NOFN project has been advanced to early 2016, with the target for completing 50,000 GPs set as March 2015 under phase 1, another 100,000 GPs by March 2016 under Phase 2, and the remaining 100,000 by December 2016.

Each of the GPs will be connected to the block PoP in a point-to-point linear topology. The network will utilise gigabit-capable passive optical networks (GPON) technology to provide layer-2 connectivity between the two end points, and the optical network terminal (ONT) installed at GPs will provide the end point connectivity. Beyond this point, the service providers are expected to build their own access network to cater to the needs of their customers.

Before embarking on this substantial and ambitious task, BBNL carried out a pilot project at three locations, covering total of 59 GPs: Arian in Ajmer District of Rajasthan, Parvada in Vishakapatnam district of AP, and Panisagar in North Tripura. This work was completed on 15 October 2012 and the department of IT has rolled out e-governance services and connected government institutions for e-education, and dispensaries for telemedicine, etc. The whole experience has been taken into account when planning how best to scale up the project and ensure that the benefits of broadband connectivity reach Indian citizens in rural areas.

BBNL has surveyed almost 90% of the GPs, and engineering plans indicating route connectivity, fiber planning and equipment planning of more than 4,000 blocks across the country have been posted on the BBNL website where anyone can have a access to these plans. In addition, BBNL has tendered out optical fiber cable, accessories and GPON, solar equipment required for the project, and finalised the same. On the execution side, BBNL has given the execution job to three CPSUs who have the strength to carry out this work, namely BSNL, Railtel, and PGCIL, and they have started the trenching, ducting and cable laying works in various parts of the country. As a first step, this task of making an optical tree and installing and connecting the equipment has been completed in Sidilgatta block near Bangalore in Karnataka state. The GPON equipment has undergone field trial tests, and tests have been conducted on various services at a Gram Panchayat-level, which are connected on this network.

The strength of the network interface controller for geographic information system mapping, and C-DoT for the network management system have been leveraged, and a test bed has been established by C-DoT in their premises in Bangalore as a part of this project to centrally monitor all GPON installed at block, GPs and the optical fiber connecting them. The system will provide inputs to the network operation centre in order for faults to be addressed.

BBNL will be a lean organisation which will manage the whole network through state-of-art facilities. Having laid this infrastructure, the organisation will provide non-discriminatory access to all the service providers because, ultimately, NOFN is a national project that needs to be leveraged by all telecom players, be it telecom services providers, Internet service providers, cable operators or application providers.

Under NOFN, BBNL intends to undertake the work of establishing a government user network (GUN). GUN has been envisaged as an extension above NOFN in order to address the concerns of delivery of services to the rural population. Under the project, connectivity will be aggregated at district level from where it can be connected to the national knowledge network and the Internet, as well as other state-wide/nation-wide networks as required. There will be two parts of GUN:

Backward aggregation: establish the connection between block and district HQ level, and aggregate the network at district level. The point of interconnect (POI) is proposed at district level; and

Forward extension: extend the connectivity from GP PoP to two selected government institutions, and provide low cost WiFi Internet services within the vicinity of GP.

P.K.Agarwal is Director (Planning) at Bharat Broadband Network Limited (BBNL)

Gimme Fibre Day

Every year on 4 November, people and businesses around the world celebrate Fibre to the Home to let everyone know they want fibre… and they want it NOW!
Why? Because Fibre to the Home is the only future-proof Internet access solution, and it positively impacts individuals and their communities.

Photo credit: Folan

Do you know why **Gimme Fibre Day** is celebrated every year on 4 November? Because it is the birthday of Nobel Prize winner Sir Charles Kuen Kao, the man who changed the way the world communicates… by transmitting light through optical fibres.

Eager to learn more about **Gimme Fibre Day**?
Visit our website:

www.gimmefibre.eu

Discover the whole story about **Gimme Fibre Day**, and find everything you need to participate in next year's celebration.

Check out Gimme Fibre Day 2014 activities!

Interviews

Have you ever wanted to throw your PC out the window? We interviewed people in Vienna and Paris to see what they thought about fibre and their need for it!

#run4fibre

Tired of your slow Internet connection? For this contest, participants laced up their trainers and demonstrated just how far they were willing to go for fibre.

Join us!

Organise your own event, competition or product launch to celebrate **Gimme Fibre Day** next year, and contact us at gimmefibre@ftthcouncil.eu to tell us what you're planning.

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