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Contents

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Tel: +603 7729 4886 Fax: +603 7729 4887 Email: info@amginternational.net Website: www.amginternational.net

The Light Age

"Members of the FTTH Council Global Alliance (FCGA) share a vision – to make the general public receive and experience the social benefits that come with technology, and educate the industry, governments and the general public on the real advantages of fiber optics.

Thanks to technology, we can connect to anyone from anywhere in the world and fiber optics is at the forefront, making consistent connections faster than they have ever been, as it relies on pulses of light through an optical fiber, which is not disrupted by electromagnetic interference thereby boosting its clarity, volume and consistency over very long distances with minimal signal degradation. The minimal loss of signal also means lower-power transmitters which saves fiber optic providers money.

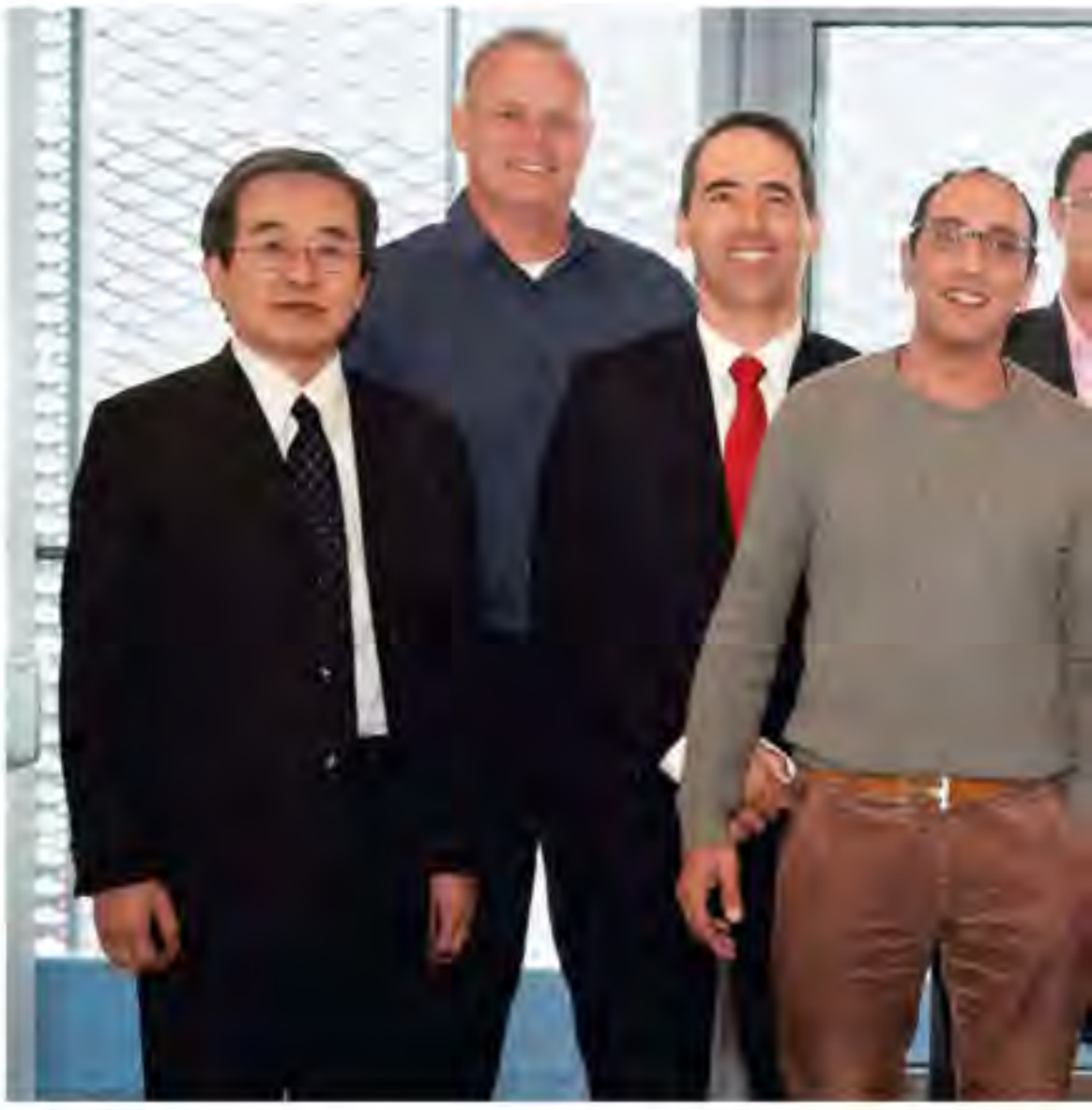
The FCGA was created to establish a common platform based on our shared vision to create benefits in areas that affect people universally such as electronic and mobile education and health applications. The five founding members of each council are not only the pioneers but also passionate advocates of bringing fiber optics to every home, and the FCGA is at the front line of embracing, educating and encouraging the public to embrace the technology.

That is why we publish *The Light Age* – to highlight the positive aspects of fiber to the home. Just as important, it promotes the need to change, to embrace the future, and to become a part of the 'light age', something I have been pushing for the past 25 years.

My vision for the FCGA is that we become one voice to educate governments and industry, and the general public. Europe has taken the first step by setting up such a scheme with the 'World of Applications Dome' project, an interactive, global road exhibition which was unveiled at the European Parliament in Brussels in September 2012, demonstrating several technological applications such as smart home grids, teleworking, and e-Learning, e-Health and video conferencing, and in doing so, allowing the public to experience the technology of fiber, see its benefits and understand how it works.

Fiber to the home is a future-proof technological solution to connecting and meeting the demands of businesses, governments and the general public today and in the future. We all need to embrace The Light Age.

***Below*: The founding members of the FTTH Council Global Alliance (FCGA). From left to right: Ishibashi Yoshihiro (FTTH Council Asia-Pacific), Johan Kleynhans (FTTH Council Africa), Carlos Barroqueira (FTTH Council Europe), Frank Jaffer (FTTH Council Asia-Pacific), H. Munasir Choudhury (FTTH Council Asia-Pacific), Juanita Clark (FTTH Council Africa), Edgar Aker (FTTH Council Europe), Gilbero Guitarte (FTTH Council Americas LATAM Chapter), Hartwig Tauber (FTTH Council Europe), Heather B. Gold (FTTH Council Americas), Storaasli Olaf (FTTH Council Europe), Nadia Genis(FTTH Council Africa), and Christine Beylouni (FTTH Council MENA).**



"I love how everyone in the council is family. We are a committed global family, with leaders who want to make certain that their regions are connected and we need co-operation from everyone, to embrace the technology."

Fouad (Frank) Jaffer
FTTH Council Global Alliance (FCGA)
Chair 2013

FTTH Council Contacts

FTTH Council Asia-Pacific
Email: secretary@ftthcouncilap.org
President: Monique Morrow
General Manager: H. Munasir Choudhury

FTTH Council Europe
Rue des Colonies 11
B-1000 Brussels
Belgium
Tel: +32 2 517 6103
Fax: +43 2855 71142
Email: info@ftthcouncil.eu
President: Karin Ahl
Director-General: Prof (FH) Hartwig Tauber

FTTH Council Africa
Postnet Suite #477
PrivateBag X1007
Lyttelton 0140
South Africa
Telephone: +27 12 661 1592
Fax: +27 (0) 86 579 2606
Email: admin@ftthcouncilafrica.com
President: Richard Came
CEO: Juanita Clark

FTTH Council Middle East/North Africa (MENA)
Wadi Saqra Street
Building no.46
Amman
Jordan
Tel: +962 6 4621621
Fax: +962 6 4625285
Email: info@ftthcouncilmena.org
President: Faris Awartani
Director General: Christine Beylouni

FTTH Council Americas
FTTH Council Americas
6841 Elm Street, #843
McLean, VA 22101-0843
USA
Tel: +1 202-524-9550
Email: info@ftthcouncil.org
President: Heather Burnett Gold
Chairman: Kevin Bourg

For Latin American Inquiries:
Tel: +1-919-557-8616
Email: latamchapter@ftthcouncil.org
Chairman: Gilberto Guitarte

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Bolstering Fiber

The Progress of Fiber in APAC

FTTH COUNCIL ASIA PACIFIC | FIBER TO THE HOME APAC

The Fiber-to-the-Home (FTTH) Council Asia-Pacific (APAC) is a non-profit organisation set up in 2005 that aims to educate and inform the various industries and general public on the opportunities and benefits of fiber optics. The council promotes and supports industries that wish to become involved with FTTH, allowing them to share the technology and experience from countries which have a fiber infrastructure in place, such as Japan, Korea and Hong Kong.

"APAC has a highly diverse region and various topologies, applications and government policies. We can benefit from the experience and continue to learn from complex scenarios."

Monique Morrows, President, FTTH Council Asia-Pacific

Voluntary Work

Although the members of the FTTH Council APAC are from different backgrounds, they share a common keenness to accelerate the adoption of optical fiber access, and help everyone become fiber connected. Initially the council focused on promoting FTTH market development and providing an accurate view of FTTH.

"In the beginning, we were mostly made up of volunteers," according to Ishibashi Yoshihiro. "However, as we began expanding and started to organise activities such as workshops and seminars all over Asia Pacific, we realised we needed someone to help manage issues the Council was facing such as planning activities and liaising with members."

These tasks fall upon General Manager, Munasir Choudhury. With his strong fiber-related background, having worked with both the equipment and network players, he is able to see both sides of the industry. With the support from the Board of Directors, he now handles proposals, communication, strategic partnerships and collaboration with the various parties that deal with the Council.

"I find the position both pleasing and professionally fulfilling, as I have a passion for fiber technology due to its unlimited potential," Choudhury states. Being in charge of the operations and events in Asia Pacific, he finds the logistics a challenge, as members from various parts of the world need to be brought together at the correct time and location.

The solution was to take advantage of the borderless world of the Internet. According to Dr Bernard Lee, Vice President of the FTTH Council APAC, "We have engaged social networking to liase with members from all over. This includes regularly updating the Council's home page, and using Facebook and Twitter to have better interaction with members so they feel more engaged now."

"The highway is now ready in several countries, so it is time for them to build the vehicles to travel along it."

Dr Bernard Lee, Vice President, FTTH Council Asia-Pacific

Challenges and Future

Due to such efforts, fiber penetration rates in APAC have increased. Monique Morrows, President of FTTH Council APAC, states that more governments realise the benefits of FTTH and want their citizens to enjoy them, in order to enable useful applications such as cloud computing, HD video communications, virtual healthcare, virtual classroom and other gigabit applications.

"Our vision is to guide and serve the under-represented regions in our community, so we are looking closely at working with countries like Bangladesh, Thailand and Vietnam to provide best practice deployment guidelines," she says.

It does this by tapping the expertise of more matured markets. As Ishibashi explains, "Countries like Japan have high fiber-optics penetration and also a lot of experience in handling the problems of setting up the infrastructure. The council uses this advantage to help countries in the region which are starting out."

The Council provides regular workshops, and through them promotes FTTH to industries in those countries. These workshops also give participants the opportunity to mingle and network with experienced FTTH industry players such as Ishibashi, and thereby gain skills and know-how. Also, several new members have chosen to join the Council as a result of these workshops.

"The Council cares for its members and tries to make them feel like a part of the council, encouraging them to take part in activities such as workshops and seminars."

Ishibashi Yoshihiro, Secretary, FTTH Council Asia-Pacific

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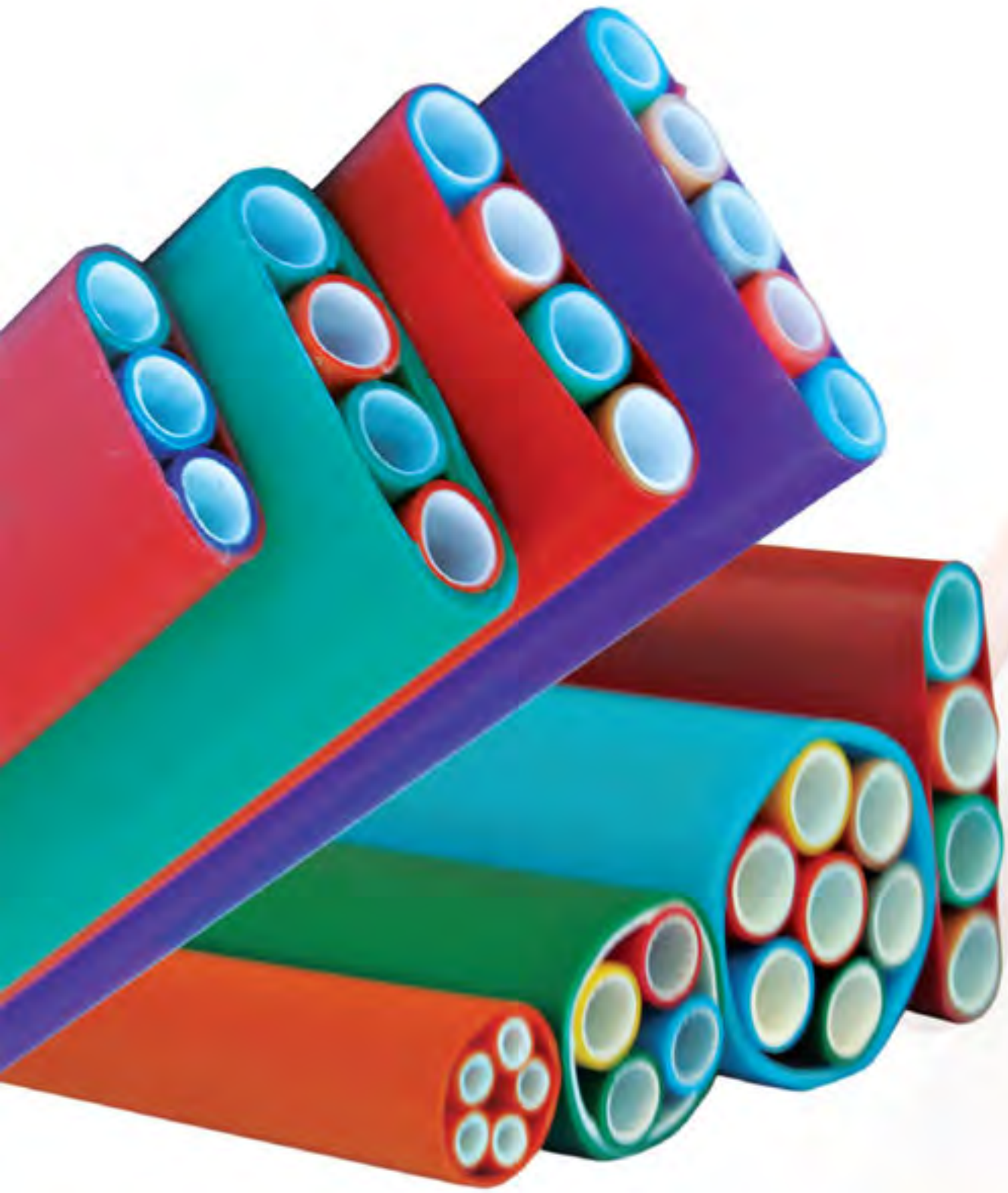

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Continued from page 8

Using these methods to disseminate knowledge and interest, the Fiber-to-the-x (FTTx) subscriber base in Asia Pacific is forecast to grow from 79 million at 2012 to 145 million in 2016, with China expected to account for up to 82 million subscribers.

Application

Aside from setting up infrastructure, FTTH Council APAC is also looking for new applications using fiber-optics, such as interactive and 3-dimensional television. This will allow it to become a sustainable business, especially for countries that have achieved high fiber connection rates, and allows for faster communication.

"Where there is speed, it is easier to start a business." Lee adds. "I regularly liaise with the education and training committee, to assist organisations in developing training programmes for the local FTTH users and industries, giving them information on how fiber can help their business."

"The field of Fiber Optics is no longer unknown territory, and the Council is here to help those who are interested."

Munasir Choudhury, General Manager, FTTH Council Asia-Pacific

The FTTH Council APAC continues to work hard at promoting optical fiber to consumers and organisations, as well as educating them to enhance and sustain a high quality of life. The Council will strive to supply a consistent, accurate view of the FTTH, pushing its market development and becoming the resource base for optical fiber access in the Asia Pacific Region.

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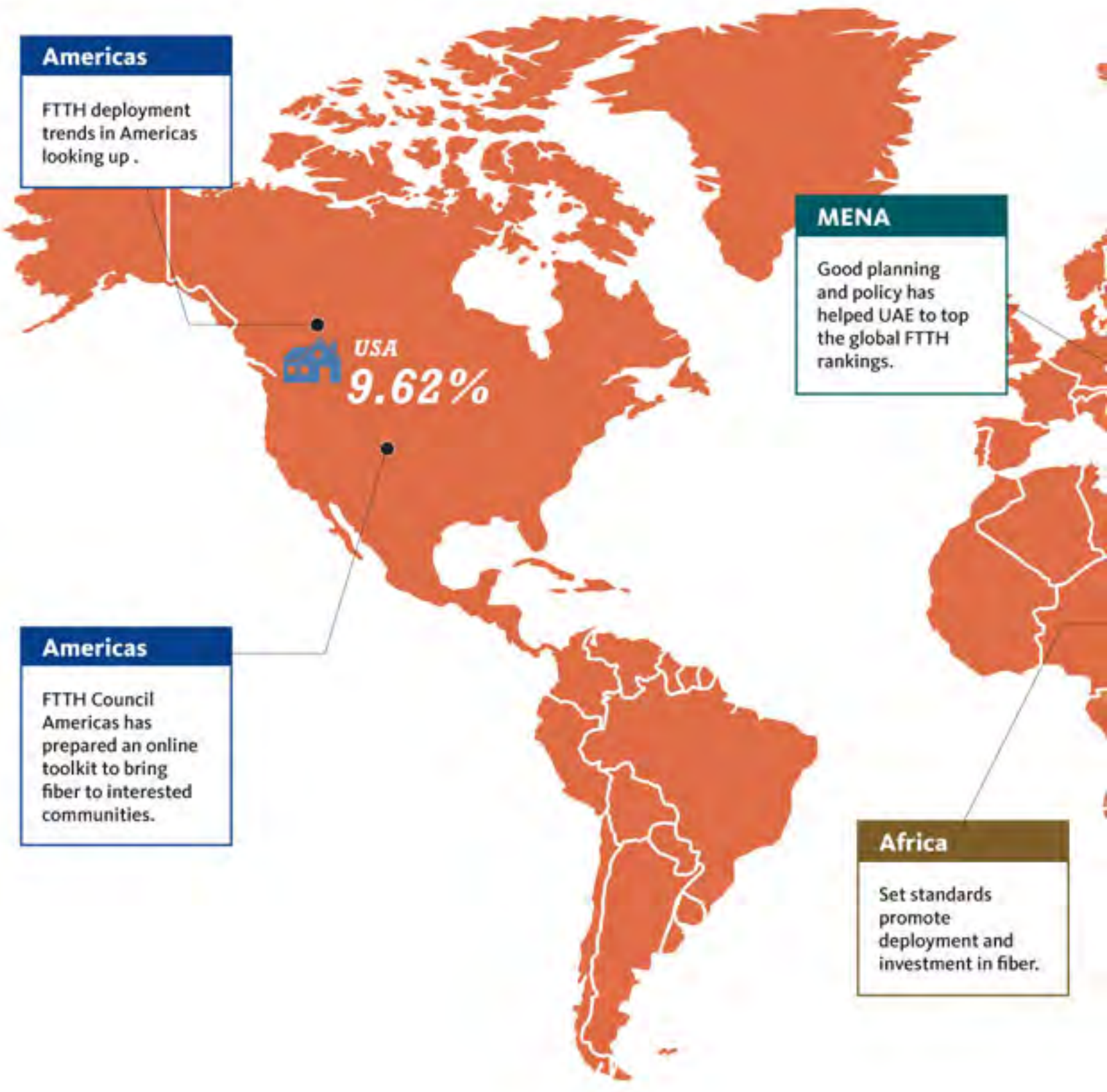


Americas

FTTH deployment trends in Americas looking up .

MENA

Good planning and policy has helped UAE to top the global FTTH rankings.

Americas

FTTH Council Americas has prepared an online toolkit to bring fiber to interested communities.

Africa

Set standards promote deployment and investment in fiber.

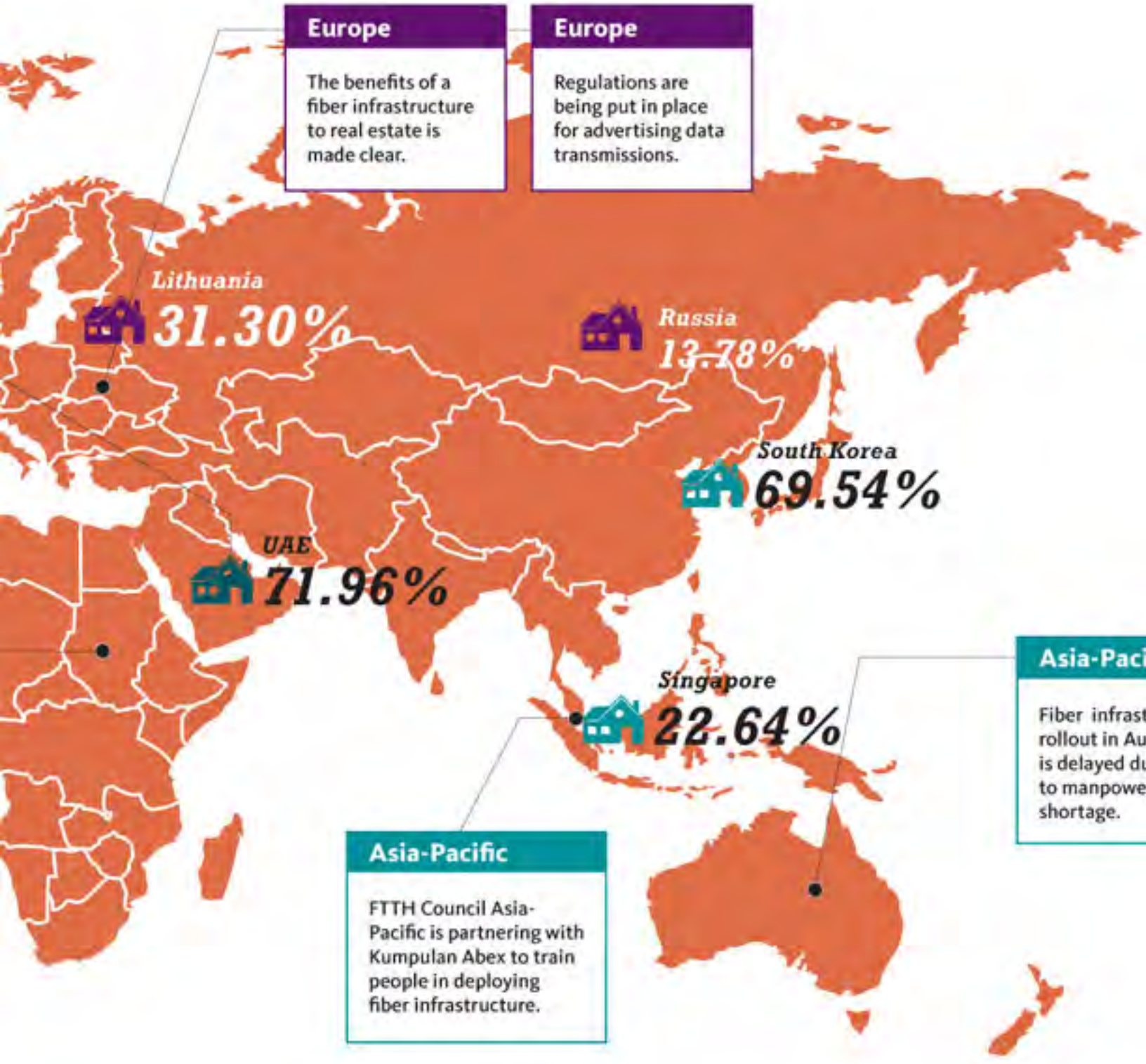
An overview of the news and breakthroughs taking place in fiber optics across the five FTTH Council Regions.

Europe

The benefits of a fiber infrastructure to real estate is made clear.

Europe

Regulations are being put in place for advertising data transmissions.



Asia-Pacific

Fiber infrastructure rollout in Australia is delayed due to manpower shortage.

Asia-Pacific

FTTH Council Asia-Pacific is partnering with Kumpulan Abex to train people in deploying fiber infrastructure.

Household Penetration at December 2012

Training Manpower

Providing Fiber Design and Implementation Solutions

As a global manpower shortage is affecting the worldwide deployment of fiber, the FTTH industry is taking more steps to facilitate training and creating skilled fiber workers for the region. Among these include having the Multimedia University (MMU) of Malaysia partner Melbourne-based leader in the telecom market, SENKO Advanced Components (Australia) to facilitate knowledge transfer between the two parties. In the meantime, the FTTH Council APAC is also working with Kumpulan Abex (KABEX) a company set up in 1988, a veteran in the field of fiber optics and a key player in improving the training in the region to ensure service quality of telecommunications in Malaysia.

(From left to right) SENKO Advanced Components (Australia)'s R&D Director Dr Bernard Lee and SENKO Asia Pacific Managing Director Fouad (Frank) Jaffer, Victoria's Commissioner to Malaysia and South East Asia Tim Dillon and Chairman of Telekom Malaysia and Multimedia University (MMU) Dato' Sri Dr Halim Shafie following the signing of the MoU between SENKO and MMU.

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Education For Training

MMU launched its new Graduate Institute of Engineering (GIE) on the 3rd of March, with the aim of becoming a regional leader in tertiary education in the field. In conjunction with the launch, the university also signed a memorandum of understanding (MoU) with SENKO, to facilitate knowledge transfer between the two parties.

An increase in output of engineering talent is considered vital to the telecommunications industry in the Asia-Pacific region, which is predicted to experience an acute manpower shortage by 2015. The MoU is intended to assist MMU in delivering postgraduate professionals to cater to a market with an estimated 58 million customers across the region.

"In a world that is fast becoming borderless, the cross-cultural exchange of ideas is important for sustainable industry growth and for innovation to continue to thrive."

Tim Dillon, Victorian Government Comissioner to Malaysia and South East Asia

Sturdy Background

MMU is Malaysia's first private university and a top 200 institute in Asia, with a strong output in terms of graduate turnout as well as research. The university is a key player in the country's ICT development and hosts 13 research centres, whose areas of focus include engineering, computing, informatics, microsystems, biometrics, virtual reality, microwave and telecommunications.

Meanwhile, the multinational SENKO has a strong 60-year track record for expertise in fiber optics and has one of the industry's largest

A view of the distribution points (DPs) which KABEX develops and installs.

Continued on page 18

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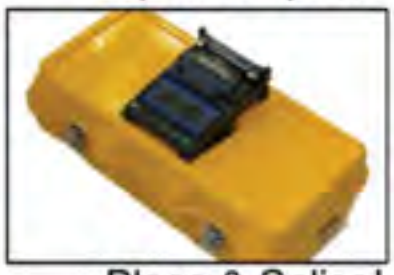

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product portfolios. The state of Victoria, where SENKO is based and with whom it has been collaborating for two decades, is Australia's technology leader and a major source of the nation's revenue, generating A$27 billion (US$28.2 billion), representing 28% of the national total in 2012.

Well-Versed Consultant

FTTH Council APAC is also co-operating with Kumpulan Abex (KABEX), which introduced fiber technology to Malaysian telecommunication companies (telcos) and improved their standard of service quality using cutting-edge fiber-optics technology, to train skilled fiber workers.

"We have been deeply involved in the sector for more than 20 years, and have helped telcos improve the standard of their service quality during that time"

Tey Kok Leng, General Manager, Kumpulan Abex (KABEX)

KABEX has been a key player in the introduction of high speed internet services in Malaysia, allowing it to catch up with other advanced countries such as Japan Korea and Singapore. It collaborated with network service provider Telekom Malaysia (TM), providing full support and research for the development for the Unifi roll-out plan.

Unifi is a speed broadband service that uses fiber optics to deliver high speed internet, phone and IPTV services to TM customer premises, allowing businesses and individuals in Malaysia to tap into the wealth of information online at blazing speeds.

A close-up of a FWS (fiber-to-wall) socket,which will be installed in every home with a Main Distance Frame (MDF) system.

Aside from telcos, KABEX also uses its expertise in automation and security engineering (ASE) to provide services to universities, public sector institutions, property developers and consultancies, using fiber-optic reliant security solutions such as CCTV, intercom access points and automatic barriers. Its decades of experience has enabled it to develop comprehensive Research and Development facilities, augmented with high quality products brought in from other countries, and its range of services also includes Fiber-To-The-x (FTTx) consultancy, design, installation and safety testing.

Joint Journey

By working together, technicians and service providers can be trained, providing solutions for installers and contractors and overcoming problems which often arise during installation such as riser space and surface cabling. Kabex is well placed to provide the region with manpower skilled in the field of fiber optics, as they have associate companies in countries such as Singapore, Thailand and Vietnam.

Similarly, the MoU between MMU and SENKO is also well able to generate graduates armed with skills to deal with fiber-related infrastructure matters, which will alleviate the manpower shortage expected to arise in the future.

Commenting on the signing of the MoU, Victorian Government Commissioner to Malaysia and South East Asia Tim Dillon said, "In a world that is fast becoming borderless, the cross-cultural exchange of ideas is important for sustainable industry growth and for innovation to continue to thrive." Noting that Melbourne is Australia's economic powerhouse and hub of innovation and technology, he also described the MoU as "bringing to life the spirit of Melbourne."

As more countries are trying to set up network infrastructures, steps by the FTTH Council APAC to facilitate such partnerships are needed to meet the increasing demand for such workers. In this expanding field, banding together will help to bring the dream of a prosperous, connected world using fiber into reality.

Attending the signing of the MoU between SENKO Advanced Components (Australia) and Multimedia University (MMU) were (seated, L-R) SENKO R&D Director Dr Bernard Lee and SENKO Asia Pacific Managing Director Fouad (Frank) Jaffer, MMU President Prof. Dato' Dr Muhamad Rasat Muhamad and GIE Director A/Prof. Dr Tan Ching Seong.

Schedule Change

Australian Rollout of Fiber Formally Delayed

The company in charge of the rollout of a fiber optic infrastructure in Australia, NBN Co has revised its rollout target, currently behind by about three months, due to work on the ground progressing at a slower rate than forecast. As a result, only 190,000 to 200,000 premises will be covered by fiber in June, missing the original target of 341,000 premises.

The Chief Executive of NBN Co, Mike Quigley announced that his company and its construction partners will be training and employing a team of specialist workers to help with fiber rollout in the Northern Territory, Australia.

"We are accountable for the delay and are disappointed it has occurred," NBN Co Chief executive Mike Quigley said, adding that they would work closer with their suppliers across all parts of the network to build and monitor progress, ensuring every individual element would be ready within the required timeframe.

Ground Problems

NBN Co's public projections were based on commitments from the construction contractors, who had claimed they could complete the 30th of June target. However, the number of construction workers on the ground needed to achieve the target was insufficient.

"The lack of mobilisation, alongside contractors recently lowering their forecasts, forced us to reforecast our projections," Quigley explains. "However, this short-term issue will not affect the long-term delivery of the NBN or the overall cost of the project."

Problem Solving

NBN Co has set out three strategies to manage the delay and ensure it doesn't last longer than three months. It will now directly manage the rollout in the Northern Territory, leaving Syntheo, the contractor responsible for the rollout in the region, to manage the project in Western Australia and South Australia.

NBN Co and its construction partners will also be training and employing a team of specialist telecom workers such as fiber splicers to help recover lost time in the rollout, and the company expects up to 200 jobs to be created at its peak. Contractors will also be increasing the amount of

Specialist Telecom workers such as fiber splicers will be able to handle fiber-related problems, accelerating infrastructure rollout.

investment in equipment, manpower and technology to push the project along, accelerating on-the-ground design and planning.

Global Problem

According to FTTH Council Asia-Pacific (APAC) Vice President Bernard Lee, the number of subscribers in the region is set to jump from 58 million to 140 million by 2015, but a global manpower shortage will result in network deployment delays and swollen costs.

"With people from one region flying to work in another, there is a global shortage of optical engineers and optical technicians," Lee says. "If there is a lack of people, the deployment will be delayed, and the cost of ownership, and revenue loss, will be quite high due to this."

The Australian deployment of an FTTH network is the APAC's largest investment, costing US$60 billion of their total world investment of US$100 billion.

Other major deliverables for the fiber network such as acquiring equipment, implementing IT systems, rolling out the transit network and launching services are on track, and are not experiencing any problems. Quigley adds, "This is only a problem in the short term. NBN Co remains on track to deliver fast, affordable and reliable broadband to every Australian by 2021 as set out in our Corporate Plan."

Real Estate Boost

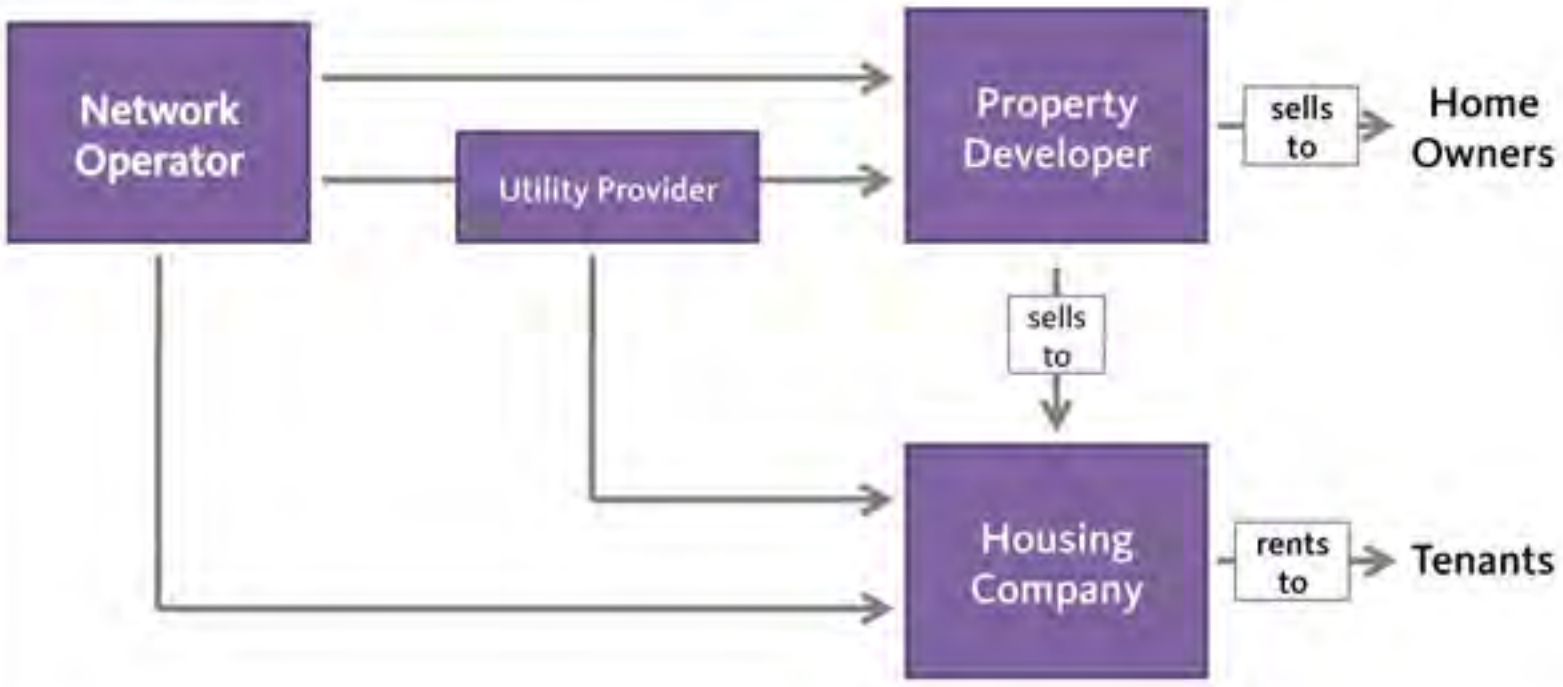
While there are many apparent benefits of Fiber-to-the-Home (FTTH) or Fiber-to-the-Building (FTTB), little physical research has been done to quantify them. Therefore the FTTH Council Europe commissioned a survey to gather feedback from real-estate players who have direct experience of FTTH/B.

Eight real-estate related companies involved with utilities, developers or builders or experienced in building or housing management in France, the Netherlands, Sweden and UK were interviewed and the regulations of countries in the European Union for broadband obligations in new buildings were analysed. The results will give more information to real-estate companies who are considering broadband solutions, as well as assist network providers in their negotiations with these companies.

Fibre to the Home Council Europe

A map of the real estate relationships, which gives insight on how the party involved in FTTH/B would affect others, and where homeowners and tenants stand.

Mapping the Real-Estate Relationships



Source: Diffraction Analysis

'Classic' Operator-Centric Financial Model

The various models of payments of service currently being used in Europe show how the payment models vary depending on which sector of the real-estate invests in the network infrastructure.

Source: Diffraction Analysis

There are several theoretical benefits from FTTH/B. As customers are willing to pay more for rent or to buy fiber property, and new developments sell faster due to customer demand, financial gains are expected. Customers are generally happier with their homes, and the building is more efficient as utility bills for common areas will be reduced.

While the direct impact the deployment of FTTH/B has on prices is still unclear, property developers have seen increasing demand for fiber-connected homes. Fiber projects are selling well despite the down market, and people from similar projects are asking developers to deploy fiber in their buildings.

Deployment of fiber broadband has definitely increased customer satisfaction. This comes not only from the direct benefits of broadband fiber, but also from indirect benefits such as better security, lower collective services bills and lower individual service bills. Fiber can be used to monitor a building, detecting problems such as heating leaks. The cleaner and safer environment has produced happier tenants.

"It used to be difficult to identify heating leaks. But with the fiber-enabled monitoring system, intervention can be done immediately. For 30,000 homes, it is estimated to get savings of up to euro 100,000 yearly."

Service providers participating in such projects also benefit, as the take-rates for fiber is high. This is because satisfied tenants and owners advertise their satisfaction, and real-estate companies promote the service to their tenants.

Combining communications with other utilities using FTTH/B has helped market energy efficient buildings, resulting in financial benefits and customer satisfaction. Real estate players who have been directly involved in FTTH/B deployment agree that they have derived various benefits from it and expect properties with FTTH/B to continue selling better than their un-networked counterparts.

EU Ranking

Fibre to the Home Council Europe

Thirty-nine countries in Europe are analysed twice yearly by the FTTH Council Europe using parameters such as the figures from the technical, financial and business model in Europe, with the most recent for the period between June and December 2012. The council announced that FTTH deployment and subscriber volume continue to grow steadily, although the gap between the leaders and laggards increases.

The number of FTTH subscribers continued to grow at an accelerated rate across the EU27 countries, adding 820,000 subscribers and bringing the number of fiber-connected homes to 6.24 million. Of these, Scandinavia, Baltic countries and the Netherlands contributed 26% of the new subscribers, France and Portugal contributed 30% and Eastern Economies 33%.

Turkey, Ukraine, Spain, Bulgaria and Russia were the top five "dynamic economies", in which subscriber growth were both the highest in the past year but also represented the highest proportion of total subscribers.

Lithuania remains the dominant fiber nation in household penetration, with 100% FTTH coverage and 31% of homes connected. Sweden takes second place, with 22.6%. Other countries with more than 10% FTTH penetration include Bulgaria, Latvia, Norway, Russia, Slovakia, Slovenia, Denmark and Portugal.

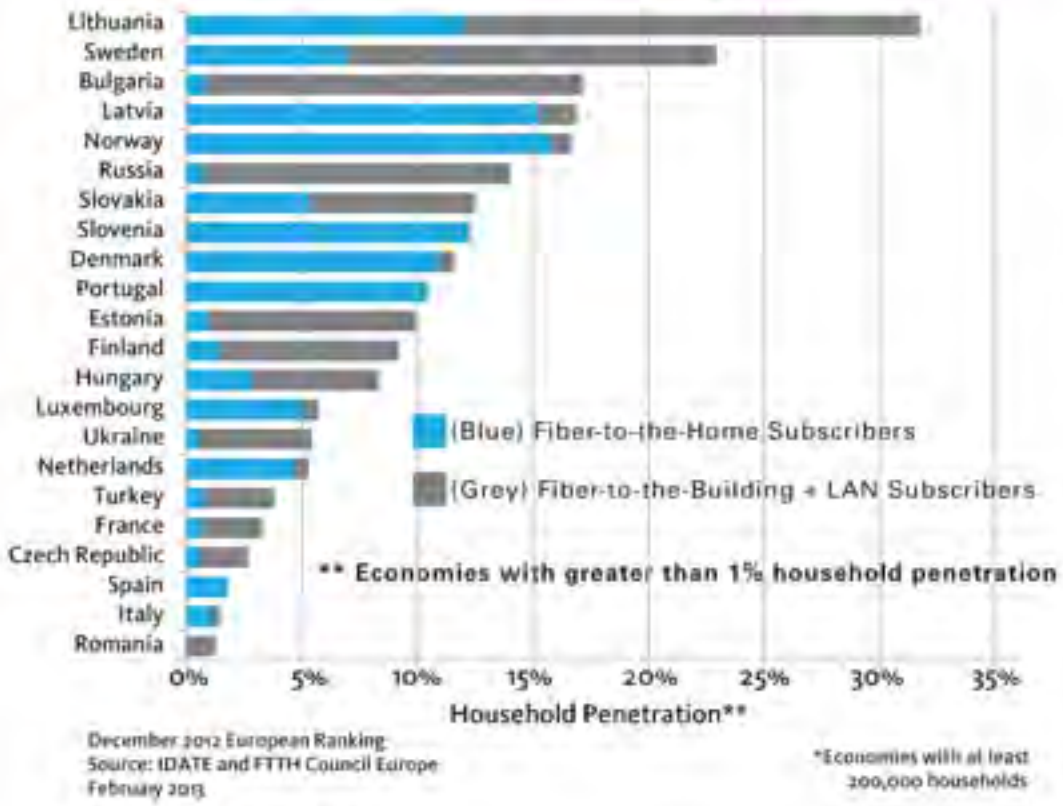
Karin Ahl, President of FTTH Council Europe, noted that Eastern Europe and Scandinavian countries have reinforced their position as fiber leaders, and the disparity between early and late adopters was becoming more apparent. She added that countries that delay the roll-out of FTTH were losing out on the opportunity to prepare for their economic future.

Many major western economies such as Italy, Spain, Germany and the UK have yet to fully realise their fiber penetration potential, with the UK and Germany failing to qualify for the FTTH ranking due to having less than 1% of households connected to FTTH, while Italy and Spain remain at the bottom of the rankings.

As Eastern Europe and Scandinavian countries reinforce their position as fiber leaders, they have gained an economic advantage over their less connected neighbours, as a good communications infrastructure is important in attracting new businesses.

Based on the study, the coverage in the whole region is still expanding due to the involvement of Eastern European countries. The interest from end-users in FTTH/B is reflected in the growing take-up rate, with Russia and Ukraine leading the market. With more countries in Europe entering the FTTH playing field due to their speed rates and guaranteed bandwidth, the continent is on its way to becoming well-linked.

Economies* with the Highest Penetration of Fiber-to-the Home/Building + LAN



December 2012 European Ranking
Source: IDATE and FTTH Council Europe
February 2013

*Economies with at least 200,000 households

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Clear and Certain

For the past few years, broadband service providers have charged consumers the full price for a service which does not necessarily achieve the speed advertised, due to the nature and physical constraints of the broadband access networks. However, Fiber-to-the-Home (FTTH) now makes it possible for these companies to provide the speeds promised.

Conventional copper cables are able to carry high-speed electronic signals over long distances, but distance decreases the signal, and because broadband capacity is shared among all the users in the neighbourhood, speed is severely limited, especially when there are more users.

This is not the case with fiber, as a well-designed fiber access connection is capable of delivering quality of service and guaranteed bandwidth. In fact, studies reveal that users often receive data at higher speeds than advertised. One such study by broadband performance specialist in the US Samknows, discovered that during peak periods, DSL-based services delivered download speeds at 84% of their advertised speeds and cable-based services delivered 99%, while FTTH services delivered 117% of the advertised speed.

FTTH subscribers are more satisfied, as the promise lives up to the marketing, giving them speed that matches or exceeds their expectations. Such customers are more likely to remain loyal to their service provider.

The discrepancy between advertised and actual broadband speeds is a hot topic in Europen, and the difference gap in speed widened over the last year. But there first initiatives to give more transparency to the user. In the UK, for example, the Advertising Standards Agency has introduced new rules for broadband advertising.

Under these rules which came into effect in April 2012, at least 10% of the customers must be able to access the speeds which were advertised, and internet service providers (ISPs) are required to provide data proving this. The ISPs must also ensure that their advertisements inform consumers if they are unable to achieve headlined speeds.

Under this ruling, ISPs in the UK lowered their advertised speeds, or removed any reference to them. Denmark took another step forward, insisting that operators guarantee a minimum speed on their broadband network. An agreement between the Danish consumer associations and the telecoms and energy industries ensures consumers receive at least 50% of the advertised speeds on all networks, from the copper-based to mobile broadband ones.

To ensure customers get what they expect, advertisers must be accurate. This is especially true for broadband consumers, who should be given clear and accurate information about services being offered. Consistent high speed should be a priority for all service providers, and will definitely generate customer satisfaction and loyalty.

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Online Support

FTTH Council Americas Launches Community Toolkit

The Fiber to the Home Council Americas has responded to Federal Communications Commission (FCC) Chairman, Julius Genachowski's 'Gigabit City Challenge', just days after it was issued. The challenge aims for every state in the United States to have at least one gigabit community by 2015, and to help communities and local telecoms plan and build their all-fiber networks, the FTTH Council Americas has launched the Online Community Toolkit.

Heather Burnett Gold, President of the FTTH Council Americas, stated that bandwidth needs in the North American market are quickly approaching levels that will require all-fiber connectivity to homes and businesses.

Thanks to this Toolkit, communities and businesses have a convenient online resource to assist them in upgrading their local networks with fiber, thus enabling ultra high-speed Internet connectivity which will help enhance their future. This is made possible as the kit has an array of templates, white papers, case studies and other features designed to assist with financing, planning and building of an all-fiber network able to deliver gigabit speeds or faster.

Referencing the overwhelmingly positive response from across the US to Google's gigabit fiber network, Heather Burnett Gold, the FTTH Council Americas President, said that this was a clear indication that civic leaders know the importance of all-fiber networks for promoting growth, by attracting businesses and creating jobs in their communities.

According to Gold, "America's future competitiveness is riding on how quickly we can move to all-fiber connectivity... The world is clearly going gigabit, and it won't be long before the level of connectivity that all-fiber networks can provide becomes a requirement for communities to stay competitive."

And the Toolkit will help communities get there. As Gold explained, "(it) is intended to help with the organisation of both public agencies and private businesses, and prepare them for a gigabit future." The aim of the kit is very much in line with the objectives of the FTTH Council Americas, which is a non-profit organisation comprising nearly 300 companies and organisations involved in building all-fiber networks or providing services over such networks.

The Council has also partnered Gig. U, an organisation that is working to help university communities adopt ultra high speed networks, to create key elements of the Toolkit, including a series of six detailed Request for Proposal (RFP) templates aimed at helping FTTH network deployers understand and initiate critical steps of the design and construction process. The Toolkit was also created using the Council members' knowledge and experiences with regards to deploying all-fiber networks and providing high-bandwidth services.

"We know that almost any community of any size can have ultra high-speed bandwidth, because many of our members are deploying next-generation, all-fiber networks in their service areas," Gold explained. "Our goal for this new FTTH Toolkit is to impart their experienced-based knowledge so that any community can get on board and be a part of the gigabit revolution."

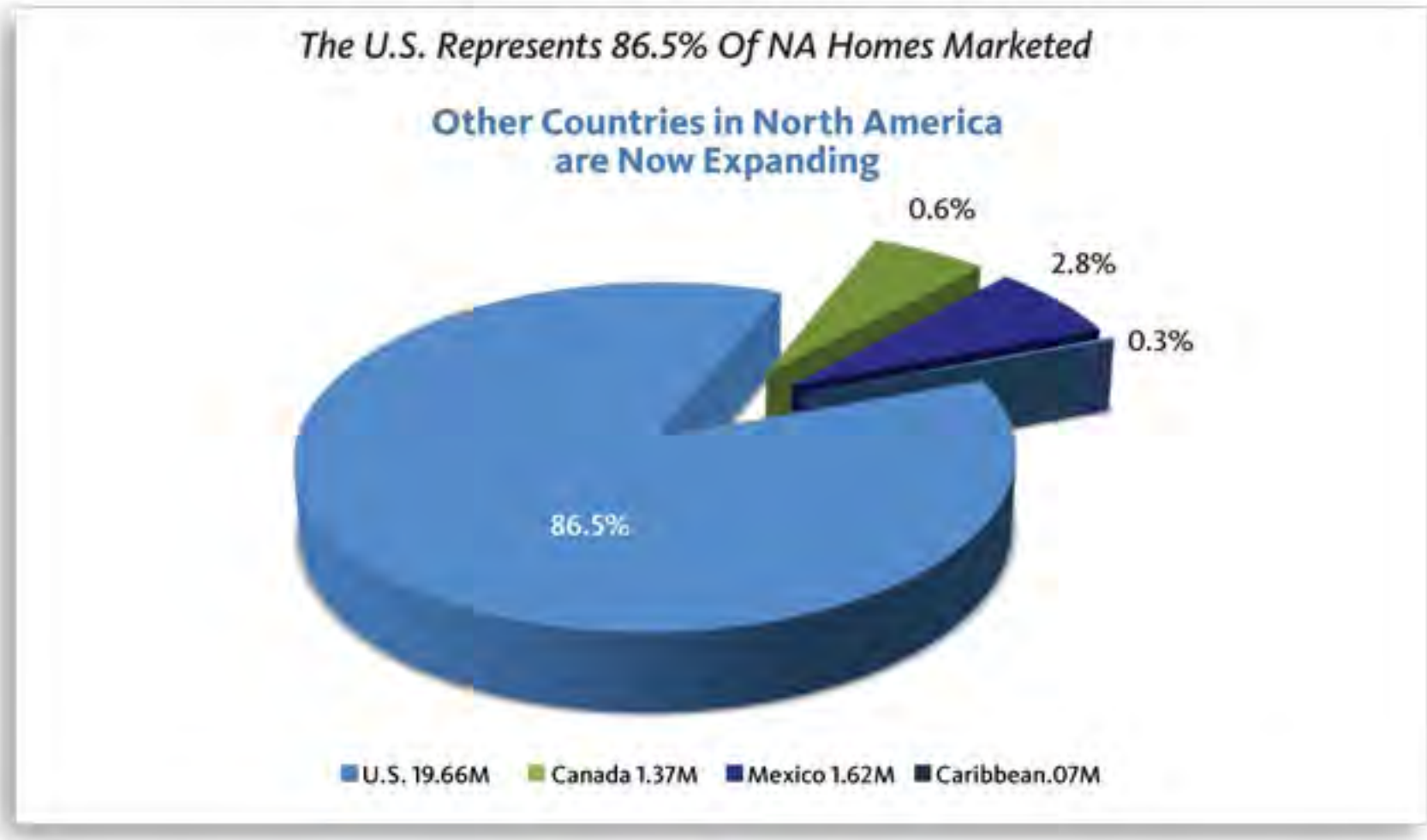
To help local and civic community leaders pursue their dreams of gigabit connectivity, FTTH Council Americas will also hold a special conference in Kansas City in May, alongside partners Google Fiber, Gig.U, KC Digital Drive, NATOA, Broadband Communities and the National Telecommunications Cooperative Association (NTCA), to contribute their expertise in helping participants plan and deploy the networks.

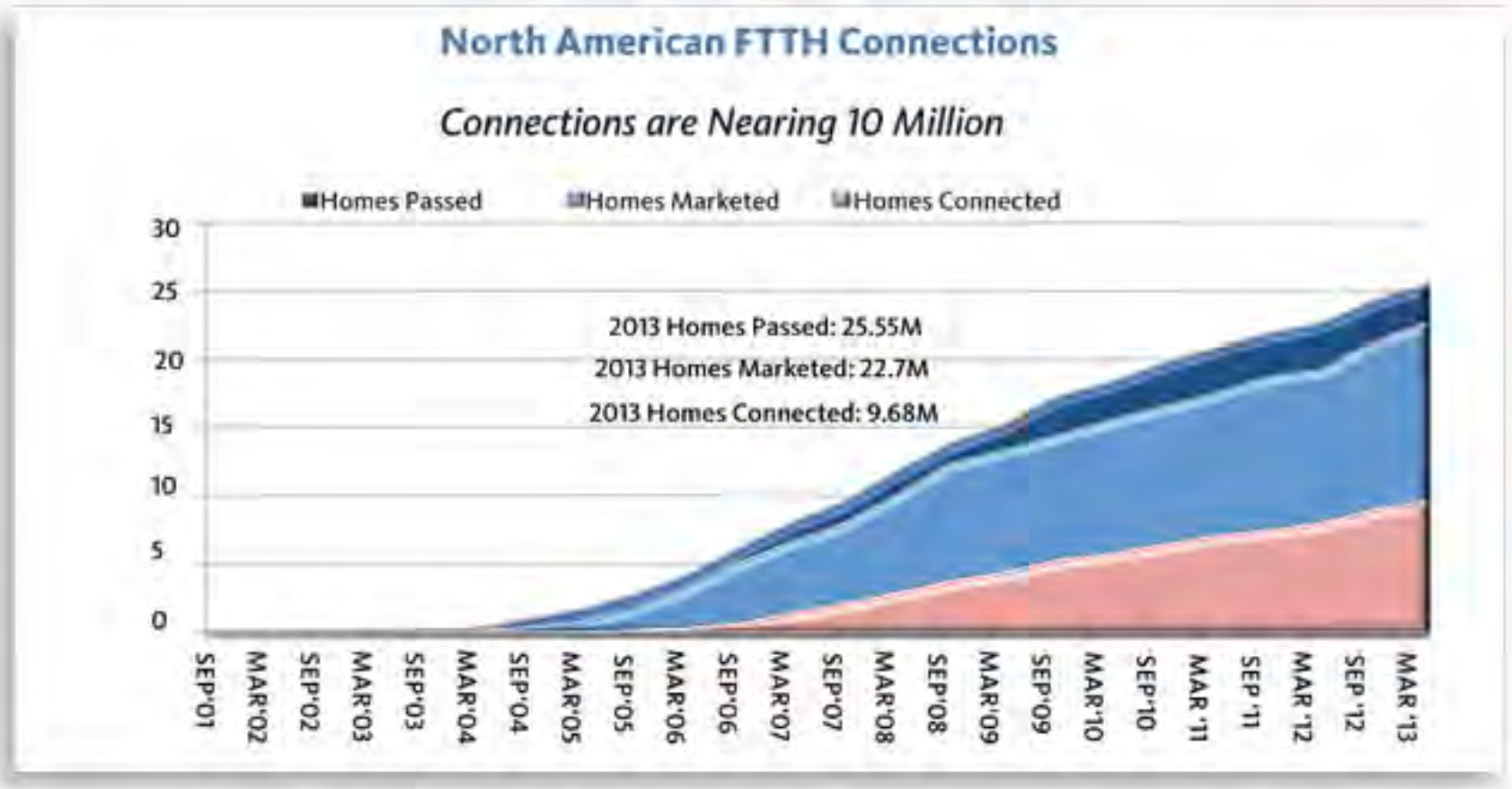
Fiber-to-the-Home networks are currently available to a fifth of all homes in North America, and there are at least 19 FTTH providers offering gigabit services to their subscribers. The Online Community Toolkit is expected to increase the number of networks, providing high speed broadband to a larger segment of the North American continent.

The FTTH Council Americas now has an online resource, the community toolkit, which will help bring fiber optics to interested communities.

North America Keeps Rising

FTTH take-up rates in North America have increased year-on-year from April 2012 to April 2013, a survey conducted by market analyst firm RVA LLC and commissioned by the FTTH Council Americas showed. The survey, which took into account results from 350 telecommunications providers across North America revealed that as of the 2nd of April this year, 25.55 million FTTH homes were passed and 9.68 million FTTH homes connected in the region. The former incidentally indicated an increase of 17.6% year-on-year, while in terms of homes connected, the number went up from 8.75 million in September 2012.





The RVA study also indicated that while the United States is still far and away the market leader, its share of the overall FTTH market in the region dropped from September 2012 to April 2013. Whereas more than half a year ago, homes in the US accounted for 92.2% of the market share, the latest figures showed that the percentage dropped to 90.9%, although the numbers increased from 8.3 million homes to 8.8 million homes.

The fastest growth rate was Canada's, which increased from 420,000 to 540,000, and now accounts for 5.6% of the market, up from 4.2% in September 2012. The number of homes connected in Mexico also rose, from 250,000 to 310,000 - thus enabling its market share to go up from 2.8% to 3.2%. The Carribean however remained the same - in September 2012 it had 30,000 FTTH homes connected for a 0.3% share of the market, and it was still the same in April 2013.

The RVA survey further revealed that North American small and medium sized telephone companies which had adopted all-fiber networks were reporting average operational cost savings of 20% per year, owing to the reduction in repairs and maintenance expenses.

Speaking on the results, Heather Burnett Gold - President of the FTTH Council Americas - said, "This latest survey shows not only the continued build-out of high-bandwidth fiber to the home networks in North America, but also provides one reason why hundreds of small and medium sized telcos have been upgrading to fiber - it saves them real money in the long run."

Furthermore, the North American FTTH market has also helped create many new businesses. While acknowledging the market dominance of giants Verizon in the United States and Bell Aliant in Canada, the RVA revealed that almost 600 small and medium-sized telephone companies have upgraded at least part of their subscriber base to all fiber.

Take up of fiber in homes has also been enhanced by strong competition, which has seen providers offering more value-add services such as faster connectivity, higher bandwidth, and Internet television. According to the RVA, increasingly sophisticated applications such as Internet video, multi-player gaming, online education, tele-medicine, and the proliferation of Internet-connected devices is expected to help drive the continued demand for bandwidth.

In conclusion, Michael Render - the President of RVA - said, "While it is clear from our survey that many prospective FTTH providers continue to face funding difficulties and regulatory uncertainty, many are still finding ways to upgrade to all-fiber because doing so reduces their maintenance costs and strengthens their opportunities to expand their subscriber base and offer customers more services.

Spliced vs Connectorisation

Why and How of Splice/ Connectorisation Approach

While the advantages of fiber connectivity are quite well-known by now, cost is one of the biggest challenges facing network operators when it comes to deploying a next-generation fiber network – particularly one that is flexible, reliable and durable – and is largely affected by whether to use splices or connectors when creating junctions or joints in a network.

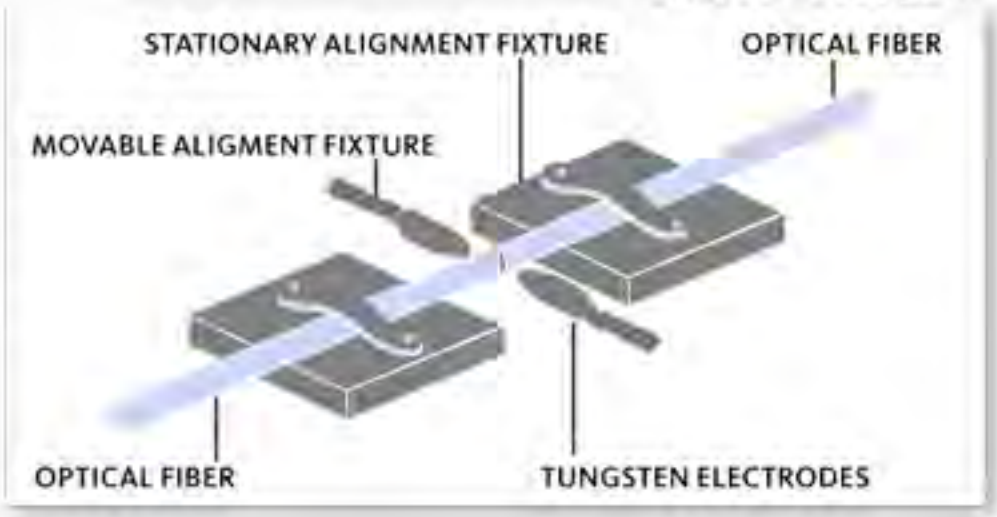
According to Jan Vandenbroeck – FTTH Business Development Manager at network solutions provider TE Connectivity, a long-distance network is a cable junction between two centres, with connectors used in the central office and fusion splices in the external plant closures as the standard practice. In order to ensure reliable connections with the lowest optical loss, splices are made simultaneously in a controlled environment during the construction of a network.

The spliced approach has been preferred for several reasons. The capital expense (CAPEX) savings from splicing is greater than the operational expense (OPEX) savings. Also, the creation of extra connection points gives rise to a greater possibility of network failure. But these objections, relevant for the long distance network, are not necessarily a concern for all points in the access network.

Different Approaches

Jan Vandenbroeck also highlighted fusion and mechanical splicing for next generation access. The first technology has been used since the late 70s, and is "environmentally and mechanically protected with a sleeve." It has an average optical loss of only 0.05dB or lower, but it is not de-mateable, requires special installation skills, is enviroment sensitive and has a relatively long installation time.

The process of fusion splicing involves using localised heat to melt or fuse the ends of two optical fibers together.



Mechanical splicing, was introduced in the early 1980s, but "it has never been really successful and remains limited to fast repair jobs." While it is not as sensitive to environmental conditions, it is also not fully de-mateable (although more so than fusion splicing) and still requires special installation skills and a long time to install.

Perhaps the most advantageous method is factory pre-termination where cables and fibers are terminated to a connector in the factory. Typical optical loss is just 0.15bB or lower, it is fully de-mateable, and does not require any special installation skills, takes less time to install and is insensitive to environmental conditions.

Jan Vandenbroeck concludes that in comparing next generation access network requirements with connectivity technology features, the deployment of factory pre-terminated solutions provides by far the best fit. While a one-size-fits-all solution is highly unlikely, he hopes that "the industry will find an adequate field-installable and de-mateable connectivity solution.

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UAE at the Speed of Light

Last December, the FTTH Council MENA gave the UAE pole position in the Global Ranking of Homes penetration, with FTTH penetration rate of 64.8%. The ranking covers all countries with at least 200,000 households where the penetration of FTTH/B has reached 1% of the total number of homes. The rise of UAE to the top has been rapid. In 2011, the UAE was ranked fourth behind Japan, South Korea and Hong Kong.

The United Arab Emirates is one of the most internet-driven societies in the MENA (Middle East & North Africa) region, where 72% of the population between the ages of 15-74 use the internet, making great strides to keep pace with demand and future-proofing through a strategy of deploying fiber optics.

Other MENA states in the Global Ranking are Jordan (1% penetration rate), Saudi Arabia (1.7%), and Qatar (22.8%), but with a home penetration rate of 64.8%, the UAE has overtaken South Korea (penetration rate of 57%) to reach the top. "This is a clear testimony that our region indeed does have lots of potential and capability," said Mr Faris Awartani, Chairman of FTTH Council MENA.

The UAE has literally moved at the speed of light to be ahead of a looming network gridlock, radically expanding bandwidth infrastructure by replacing old copper networks with FTTH/FTTB (Fiber to the home/Fiber to the building) as priority.

UAE Households Fully Wired

Since 1976, most telecommunication cables have been located underground in duct (PVC pipes) enabling cost effective and faster replacement. Building permits stipulate telecom requirements and since 2007, have incorporated FTTH/B guidelines in building design. These conditions have been included in many UAE buildings which are relatively new (less than 20 years old), making it easy to replace indoor cables with fiber.

Two companies – the Emirates Telecommunications Corporation (Etisalat) and the Emirates Integrated Telecommunications Company (du) – are at the forefront of the fixed broadband base in the country.

"Etisalat will continue its development on bandwidth intensive and innovative services such as 3D-IPTV, Interactive Gaming, Smart Homes, e-learning, e-health, e-commerce and follow industry level standards to explore and deploy XGPON and NGPON systems."

Saleh Al-Abdooli,
CEO ETISALAT UAE

Emirates Telecommunications Corporation (Etisalat)

FTTH initiative in Etisalat started ten years ago, and the estimated investment spent so far on infrastructure is around US$5 billion. The total length of the fiber optical network that Etisalat currently deploys all over the UAE is more than 2.8 million km of cable.

Etisalat connects 1.1 million homes in the country and Abu Dhabi City is fully connected becoming the first capital in the world to be so. Thus far 90% tenancies are Home Passed and over 80% tenancies are Home Ready and offer triple play services – up to 600 TV channels including HD channels and high speed internet – up to 300 Mbps to consumers and up to 1 Gbps for businesses. As a fixed as well as mobile operator providing both FTTH

and 4G services, Etisalat believes that both technologies complement each other and uses fiber in the mobile network backhaul for its 3G and 4G sites.

Thecompanyiscommittedtotransforming from a national telecommunications-centric flagship carrier to a regional ICT experience provider, proactively initiating and spearheading progressive plans to benefit the national economy. Etisalat's investment in FTTH and LTE 4G network opens up many new doors for company to utilise this technology for the benefit of their customers. "From FTTH initiative, we expect operational efficiency and better customer experience. FTTH will enable higher overall growth in the country and value for our users," said Mr Al-Abdooli, CEO, Etisalat UAE

Emirates Integrated Telecommunications Company (du)

With its sights firmly set on the future, du, the younger player in the market, rolled out its state-of-the-art fiber network with the aim of bringing about a paradigm shift in both market and conventional thinking. Today, it offers higher speeds and delivers next generation on-demand content straight to consumers. du is also committed to providing coverage throughout the whole country and seeing a UAE that is connected end-to-end.

Currently du networks support 1Gbps as a standard speed for enterprise customers and 100Mbps for consumers with a promised ambition to offer a standard speed of 1Gbps for the latter in the future. Fiber will also support wireless rollout as backhauling for mobile voice and data while both technologies serve different applications depending on the quality, bandwidth and speed.

"We will continue to invest in our fiber infrastructure with an endeavour to seamlessly connect the UAE. Fiber will continue to be an integral part of our strategy to offer nationwide multi-play services to our customers and our partnership with municipalities and utility companies will bring the benefits of FTTH to business and consumers. Going by our track record, we are confident that we will accomplish this in a time frame that others may consider impossible," said Mr Osman Sultan, du's CEO.

"du is committed to continuing our journey down the innovation path, adapting and adopting the latest technologies to deliver best services."

Osman Sultan
CEO du

Future-Secured

In the next five years, the UAE's fixed broadband base is expected to grow at an annual average rate of 12%. FTTH brings ultra high speed broadband (UHSBB), a boon to the digital economy, encompassing e-commerce, e-government, e-health and e-learning. The UAE has taken the initiative in implementing smart cities infrastructure, deploying smart grid technology and launching an ambitious plan to develop Masdar City, a new zero-carbon, zero-waste city powered entirely by renewable energy sources.

In the last decade, the UAE has consistently taken a proactive stance on advancing ICT infrastructure as the way forward to attract foreign investment and to diversify the economy of the country. The National Telecom Policy sets the tone for government efforts to develop the country into an ICT hub, with world-class competitive infrastructure as the backbone of industries in trade, finance, technology, tourism, media, education, oil, manufacturing, transportation and health.

With users and internet traffic on the rise, the UAE appears to be on the right track with its ICT policies and implementation of USHBB with its fiber networks throughout the country. If its rapid rise to the top of global FTTH rankings is any indication, it is moving at 'light speed' on the information superhighway to diversify its economy and empower its populace and workers through better connectivity.

Broadband in Africa

Foundations for Attracting Investment

Richard Came, President of the FTTH Council Africa

The benefits of broadband are no longer a subject of debate, as people know that it fosters GDP growth, creates jobs and stimulates innovation, while at the same time enabling improvements in education, health care and other social services. To capitalise on these benefits, governments around the world are developing and implementing comprehensive national broadband plans. **The Light Age** spoke to one of the founders of FTTH Council Africa, entrepreneur Richard Came, to discover how a clearly defined, predictable and well-regulated environment can help in making investment decisions.

As President of the FTTH Council Africa, as well as an entrepreneur, what is your view of the fiber industry there?

As an entrepreneur it is easy to see the investment opportunities in Africa. The continent provides a unique window of opportunity for early stage investors as the continent is embracing broadband penetration and welcoming investment. Having said that, entrepreneurs consider many aspects prior to investing and one

cannot under-estimate the micro aspects such as clear and effective policy and regulation to safeguard investment. A clearly defined, predictable and well-regulated environment plays a significant role in any investment decision. Those countries that are able to create such an environment are best-placed to attract investment on the best possible terms.

What does the current regulatory landscape look like?

In Africa it varies from country to country, but telecommunications legislation is in place in most countries. However not all countries have kept pace with the rate at which fiber optic infrastructure is being deployed and few have adopted effective rapid deployment guidelines. For investors this is critical as they will want to know that projects will be delivered on time and within budget, and not be dependent on variables such as the delivery of right-of-way approvals. It is important that issues out of the control of network operators are process-driven and that projects are not jeopardised as a result of inefficient bureaucracy.

Most African countries have defined broadband penetration targets in place, but are neglecting the current regulatory landscape and removing barriers to achieving set targets. This is even more difficult for landlocked countries as cross-border delays further affect the achievability of ubiquitous access. Africa would be well served by greater harmonisation of telecommunications regulations and standards.

What, in your opinion, is the impact of not having standards in place?

As with regulation, minimum standards promote successful broadband deployment and encourage further investment by providing greater confidence in the reliability and life-span of the network. In addition the potential for damage to existing fiber optic infrastructure is limited if consistent processes for network builds are being followed. Standards should also be adapted to the environment in which a fiber optic network is being deployed; e.g. national, long-distance, metro access and border crossings.

There is a need to consider the benefits of standardising capacity provisioning for other licencees, thereby accelerating the rate at which fiber optic networks are deployed. Other topics to be looked at include environmental impact assessments, water-use licenses and turn-around times for approvals of these.

What other issues need consideration?

Increased broadband penetration is not simply the result of deploying fiber optic network infrastructure. It is part of a complex eco-system comprising multiple inter-connected industries and utility infrastructures. If one considers the role of governments in the eco-system, Infrastructure Departments (such as roads) need to consider future spatial development frameworks and legislate the provisioning of telecommunications ducts into green field developments. Building regulations need to accommodate telecommunications ducts in new homes and offices just as they would any other utility such as water and electricity.

Furthermore, where any other state-owned infrastructure or roads are upgraded and no telecommunications ducts are in place, governments need to ensure co-ordinated deployment and avoid the cost duplication that adversely affects the affordability of broadband services.

From a private sector perspective the eco-system includes mobile operators that require fiber for back-haul and data off-load, applications providers (e.g. software as a service and cloud computing), data-centre providers and of course telecommunication network providers. All these parties need to have a comprehensive understanding of each other's drivers for effective accommodation of individual strategies.

As President of the FTTH Council Africa, Richard Came knows it is important for standards to be set in place, as this would lead to successful broadband deployment, a key factor in the growth of broadband applications. He sees the process of facilitating active dialogue between parties as one of the primary responsibilities of FTTH Council Africa, and hopes that governments in Africa will develop and implement comprehensive national broadband plans.

Informative Networking

The FTTH Conference Europe 2013, London, United Kingdom

Held in London, UK from the 19th to the 21st of February 2013 in the ExCeL London exhibition centre, the FTTH Conference remains the largest Fiber-to-the-Home event in the world. Carrying the theme 'Celebrating a Brighter Future', the informative three-day conference's agenda included workshops, exhibitions and presentations and was attended by more than 3,000 participants from over 88 countries.

Fibre to the Home Council Europe

1. In his keynote speech, philosopher and internet sociologist Alexander Bard encouraged investment in interactive technologies as they are the key to a successful future.

2. During the conference, Member of European Parliament – Gunnar Hökmark called for a Gigabit Europe.

3. FTTH Council Europe Communications Director Nadia Babaali receives a cake to 'celebrate a brighter future' during the conference.

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> "This year's CommunicAsia has surpassed last year's, both for the event and the 'Fibre' for NextGen Services Techzone and we are very pleased with the results. The exhibiting members of the FTTH Council APAC are happy with the quality of visitors to the show... We will certainly be continuing our support for Asia's premier technology event, and look forward to achieving support from the FTTH Council AP & our FCGA to support and recommend to sister councils in Europe and Americas, Mena and Africa for the "Fibre" Techzone in 2013."
>
> **Mr Fouad (Frank) Jaffer**
> *Chair, Planning, Communication & Events Committee, FTTH Council Asia Pacific*

Key representatives from FTTH Council will be presenting **'FTTH Council Updates – Learning and Experiences from Successful FTTH deployments globally'** at the **CommunicAsia2013 Summit** on the **18 June, 1410 hrs**.

Esteem speakers include:

Fouad (Frank) Jaffer
President, FTTH Council Global Alliance

Dr. Bernard Lee
Vice President, FTTH Council Asia Pacific

Hartwig Tauber
Director General, FTTH Council Europe

Heather Gold
President, FTTH Council Americas

Faris Awartani
Chairman, FTTH Council Middle East & North Africa

Juanita Clark
Chief Executive Officer, FTTH Council Africa

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Fibre to the Home Council Europe

4.

5.

4. With more than 3,000 participants, the FTTH conference is the largest gathering of its kind.

5. The CEO of JT Group Graeme Millar receives the FTTH Council Europe Award in the operator category from the President of the FTTH Council Europe Karin Ahl.

Three speakers gave their views on FTTH during the opening ceremony – Gunnar Hökmark – Member of the European Parliment, Anthony Whelan – Head of Cabinet of Vice-President Neelie Kroes of the European Commission, and Chi Onwurah – MP for Newcastle Centre and UK Shadow Cabinet Office Minister. In his attention grabbing speech, Gunnar Hökmark stated that the world will continue to change and develop, and with ambition and concrete reform, Europe can remain at the front of the digital revolution, making it a global hub in the future internet economy.

The inspirational keynote address was delivered by philosopher and internet sociologist Alexander Bard who spoke on why investing in interactive technologies is important for a country's future.

Other exciting topics discussed included how FTTH can foster the entertainment and game industry, using examples such as how independent films are making more money from international video-on-demand sales by delivering digital content using the superfast broadband and large-scale cloud storage and delivery mechanisms.

6. From left, Chi Oniwurah, Gunnar Hökmark and Anthony Whelan, who gave speeches during the opening ceremony with FTTH Council Europe Director-General HartwigTauber.

6.

There were also various interesting exhibitions and presentations by companies involved in FTTH. A total of 113 exhibitors from all over the world, allowed participants to watch demonstrations and experience FTTH enabled services, giving them a chance to understand the versatility and speed of fiber networks. Two awards were also presented by the FTTH Council Europe – an Individual Award to the CEO of Diffraction Analysis, Benoit Felten, and an Operator Award to JT Group Limited.

Nine parallel workshops including a well attended Investors Day, detailed analysis of FTTH in various countries, trends and solutions of FTTH technology, and the discussion of important issues such as the approaches, benefits and challenges of infrastructure mapping, attracted more than 1,000 delegates.

The FTTH Conference Europe was highly successful, providing participants with a chance to learn more about FTTH. The next conference will be held in Stockholm, from the 18th to the 20th of February 2014.

Radius's New Dawn

Radius Systems has been supplying major utility and telecoms companies around the world with polyethylene (PE) , uPVC pipe systems and Fiber-To-The-x (FTTx) for many decades. In an exclusive interview with **The Light Age**, Andy Taylor – CEO of the UK-based Radius Systems – tells more about the company's recent experiences and future plans.

The most significant change which occurred at Radius Systems was its acquisition by Russia-based plastics giant POLYPLASTIC Group in February 2013. The deal means Radius, which has gone through a tough 2-year period, can capitalise on being part of a substantial international group.

"Radius underwent a Management Buy-Out in 2008 from its then parent, Finland's Uponor. At that time, the markets were looking pretty strong. But then the recession followed and a complacent attitude towards our market position made the last three years particularly challenging ones" Andy Taylor explained. "However, the acquisition by POLYPLASTIC Group has brought a new level of stability and financial security, and that is great news for us," he said confidently.

Looking at the two companies, it is obvious that they are well matched. Radius Systems, for instance, has a quarter of a century experience servicing the telecoms industry by supplying telecoms ducting and next generation access products for FTTx microtubing and modular access chambers.

POLYPLASTIC Group, on the other hand, has become – since its founding in 1991 – one of Europe's largest suppliers of thermoplastic compounds and polyethylene piping solutions for infrastructure markets.

The Group is now the fourth largest pipe and fitting producer in Europe after the acquisition of Radius. Said Andy Taylor with pride, "The combination of POLYPLASTIC and Radius creates scale and a two-way synergy stream which will undoubtedly lead to benefits we can share with our customer base... I'm delighted to be CEO at the start of this exciting stage with Radius Systems – there are some great developments ahead."

New Developments

These developments include tapping into the extended technologies, innovation and portfolio offered by the expanded Group. Furthermore, Radius has invested in increasing the capacity in its plant in Lurgan, Northern Ireland. "We're listening very carefully to what our customers are asking us for. We will strive for maximum efficiency and cost-effectiveness," Taylor committed.

Under the direction of Andy Taylor as CEO and together with its new parent POLYPLASTIC Group, Radius is set to become leaner and more cost-efficient, by bringing in new ideas from other successful sectors.

One thing is certain, Radius Systems' future is bright because it will keep on innovating and adapting. As its CEO said with clear conviction, "Complacency is never an option, even when you're a leader in your market."

Signal Superiority

A Comparison of Networking Technology

As demand for bandwidth steadily increases, telecoms operators and vendors are working to enhance their broadband bit rates, by using copper-based access technology or migrating to fiber networks. Since current technologies try to allow copper networks to remain feasible, a comparison between fiber-based access with the latest copper-based access technology is useful to determine how these two will fare in the future.

The increase in processing power of computers, higher-resolution displays and greater use of images and videos, has resulted in internet connection speeds rising steadily. As more information becomes available digitally, data will need to be accessed faster, and a recent study by WIK Consult for German broadband association Bundesverband Breitbandkommunikation (Breko) highlighted that the bit-rate requirements for the applications of a well connected home is expected to exceed 200Mbps by 2020.

Physical Limitations

Transmission mediums have physical limitations, and the theoretical capacity of a communication is determined by this limit. Known as the Shannon Limit, actual signal-to-noise ratios decrease due to attenuation, where signal intensity is lost as it travels along the medium, and is affected by interfering signals. Signal loss over a distance results in a limit to the maximum length of a copper cable.

New transmission technologies are used to increase channel capacity, pushing it closer to the Shannon Limit. These improvements in technology are made by reducing the impact of interference, also known as crosstalk or developing better modulation schemes to encode data.

Copper Networks

The two main technologies using copper networks are Digital Subscriber Line (DSL) and Cable Networks. DSL provides digital data over the wires of a local telephone network, and uses a twisted-pair cable to reduce interference, while Cable Networks use unidirectional signals, originally for delivering television into homes, and upgraded to provide two-way communication.

DSL cables were originally used to transport analogue voice signals with a maximum of 3.4 kHz, but all DSL technologies exceed this frequency. High frequencies, which are required to transmit higher bit-rates, are strongly attenuated by twisted-pair cables, restricting length and speed. Higher speeds are only possible over short lengths of cable, so homes are not able to access them.

In order to improve the maximum speed over the copper twisted-pair cable, three technologies are used bonding, vectoring and Phantom Modes. Bonding is done by combining multiple copper pairs

Bandwidth and Coverage Gains on Two Bonded Copper Pairs

Source: ZTE

to increase the total capacity of the communications channel, to augment the speed or extend the reach of the DSL. Vector is an active technology that reduces far-end and near-end cross talk, reducing the noise and optimising the performance, while Phantom mode uses a differential signal across two or more pairs to create virtual pairs, which combine with the two physical pairs in the communications channel.

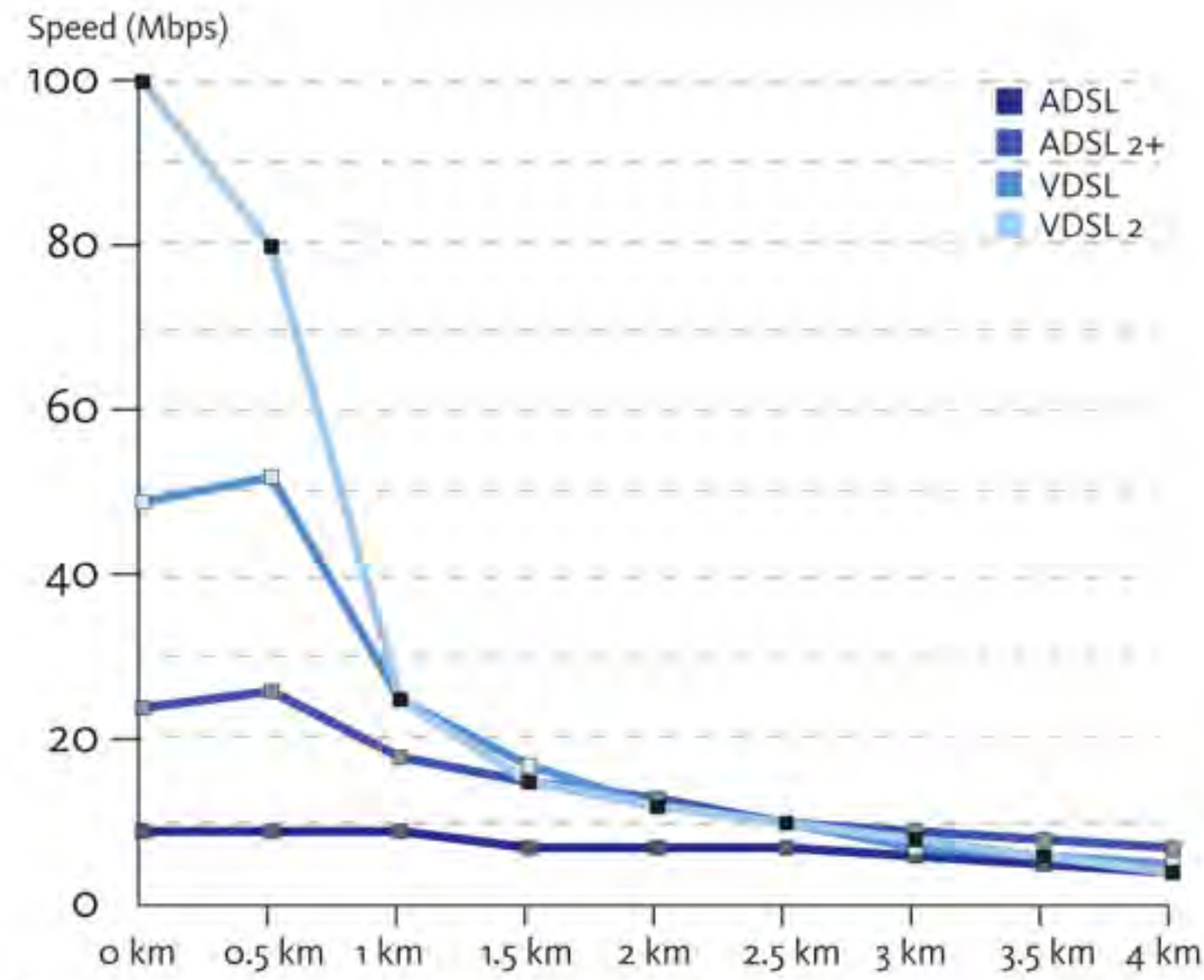
The graph shows the various technologies and limitations over long distances. Even VDSL2, the fastest data transmitting technology using twisted cable, shows a steep decline in speed after a kilometre.In comparison, fiber is able to transmit 100Tbps (Terabits per second) , for 200 kilometres.

Optical Fiber

Even with these technologies, copper comes a far second best to optical fibers in networking. Fiber

By using two bonded copper pairs, the bandwidth is almost double that of a single pair, and has better bandwidth rates for distances up to 3km. More bonded pairs are capable of further increasing these gains.

Theoretical Performance of DSL Technologies



Source: IDATE

has incredibly low signal loss and extremely high capacity, thus creating a network which can effectively ignore the Shannon Limit. Optical signals can travel 70-80km before amplification, but are limited by the pace of the development of transmission equipment. Technologies such as Passive Optical Network (PON) use optical splitters to share the signal from a fiber strand, feeding data to individual subscribers at high bit rates.

The performance of fiber optic technology exceeds that of copper by a wide margin, and ever-increasing bit-rate requirements suggest that a long-term view of the infrastructure should be taken into account. Not only are fiber-based networks able to provide faster service over longer distances, but fiber-optics technology is still developing, meaning that its full potential is yet to be realised. Undoubtedly, fiber is the way forward for the future and the time to adopt the technology of tomorrow is today.

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Managing Through Measurement

As faster speeds for a diverse range of services such as voice, data and video are being delivered, broadband service deployment becomes more complex. At the same time, just like other essential services such as electricity, water and gas, those involved from service provider to subscriber to regulator want to confirm satisfactory service supply, by verifying end-to-end (E2E) delivery. Thus, standards need to be set and met. Peter Macaulay, a member of the FTTH Council Asia Pacific (APAC), network architect from ZDSL.com and Ambassador for Broadband Forum, a non-profit industry consortium dedicated to developing broadband network specifications, raises awareness of this issue.

Peter Macaulay has been a member of the Broadband Forum for more than 10 years and was given the 'Outstanding Service Award' by the Broadband Forum for his years of service in tutorial-teaching excellence. He is also an independent trainer and consultant.

List of Deployments of High-Speed Broadband

Technology Group	Q4 2011	Q4 2012	% Growth Year	Year Adds
FTTx (inc. VDSL, VDSL2)	89,781,231	114,440,536	27.5%	24,659,305
DSL (inc. ADSL, ADSL2+, SDSL)	353,990,359	366,658,476	3.6%	12,668,117
Cable Modem	115,232,185	123,550,859	7.2%	8,318,674
FTTH	16,044,679	19,308,751	20.3%	3,264,072
Fixed wireless	9,655,531	10,811,152	12.0%	1,155,621

Source: Point Topic Q4 2012

Based on a recent industry summary by a leading resource for worldwide broadband, Internet Protocol Television (IPTV) and Voice-over Internet Protocol (VoIP) market intelligence firm Point Topic, the Broadband Forum recently reported that hybrid fiber access (FTTx) has experienced the highest market gain over the past year for broadband access types. Of the 50 million new broadband subscribers added in the previous 12 months, 28 million (55.8%) are being served by fiber. Currently, there are more than 134 million FTTx and Fiber-to-the-Home (FTTH) deployments worldwide, and fiber deployment has overtaken cable and now accounts for 21.1% of the world broadband market.

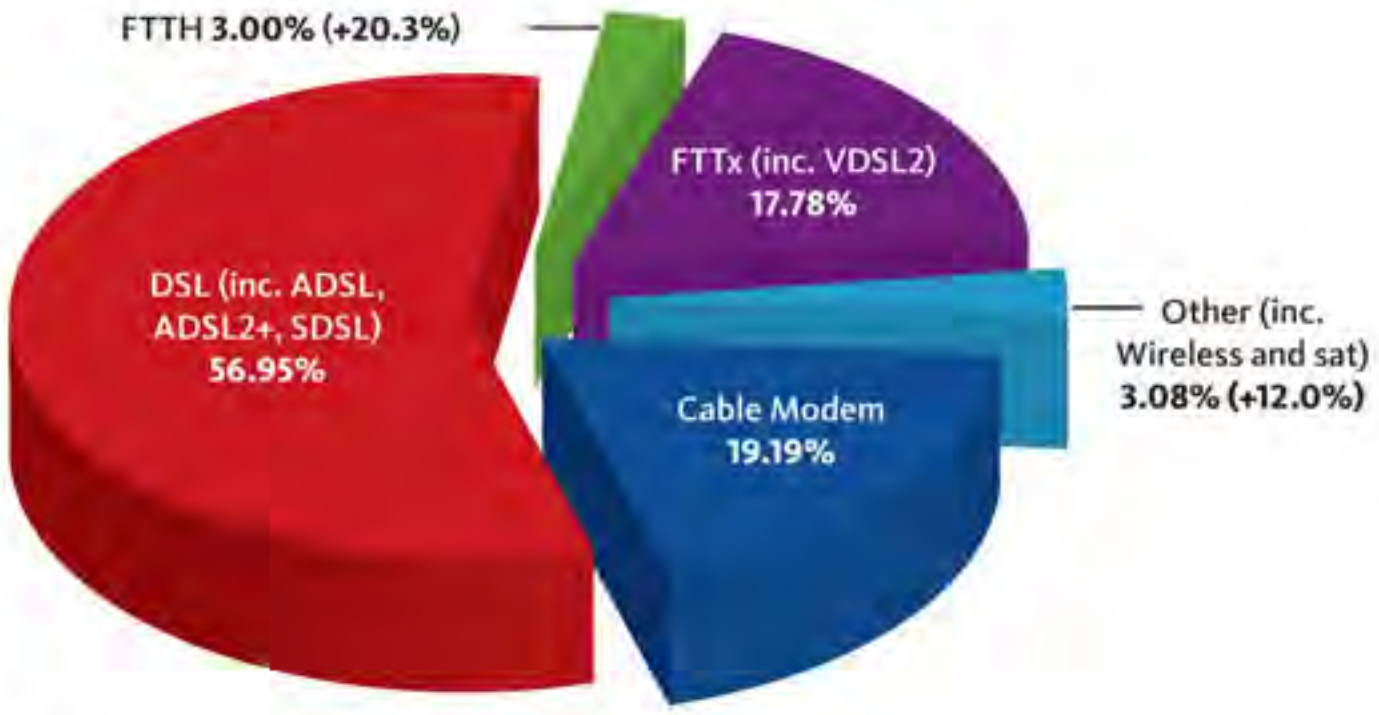
The growth of FTTx is noteworthy and significant and points to the success of the rapid broadband deployment models adopted by service providers such as Telekom Malaysia Berhad and Hong Kong Broadband Network Limited. The Broadband Forum has published the architecture for different deployment models, developing technical reports to assist parties with measuring the services delivered by Fiber-to-the-distribution-point (FTTdp), where the fiber architecture is within 200m of the premises to which it is being delivered. Furthermore, the International Telecommunication Union, Question 4 Study Group 15 (ITU-T Q4/15), which deals with topics regarding broadband access over metallic conductors, is also developing methods to assist with FTTdp.

Service Effectiveness

Together, they are championing a focus on very-high-bit-rate digital subscriber line 2 (VDSL2) and G.fast (a method of data transmission optimised for short loops), moving forward to include low power modes complete with both life-line phone and reverse power support. Thus, a successful deployment uses fiber and a variable 0-250m of copper or wireless to the subscriber's end device. This model is supported by major telecommunications providers such as British Telecommunications (BT) and AT&T.

When subscribers think of service delivery, they are considering the delivery to the end device, for example, the laptop, tablet or HDTV set. In order to meet user expectations and experiences, the complexity of measuring E2E service increases and the evaluation of this becomes more important.

Global Market Share by Technology Q4 2012



Source: Point Topic Q4 2012

However, there is no one size fits all solution, as there are regional differences for all services provided. The complexity of measurement arises from the variable amount of copper and wireless to the premises after being delivered to FTTdp by fiber. It is also very clear that few tablets will be connected with fiber, but that is where the user experience takes place. An E2E measurement system that includes fiber and wireless or copper is needed, to measure both ends of the delivery.

The task of the Broadband Forum is to provide globally applicable tools and specifications to ensure that service providers and vendors achieve standards-based deployment. The Broadband Forum Certification Programme has now certified several vendors for Gigabit-capable Passive Optical Network (GPON) 2.5 Gbps inter-operability, with the certification programme for vendors of 10 Gbps GPON scheduled for take-up next. There are also coordinated activities being developed at the Broadband Forum and the ITU-T to test and measure broadband service, to verify both upload and download speeds to the fiber end-point and to the service delivery end-point. These recommendations will assist the service provider, subscriber and regulator, and are designed to bolster the growth of superfast broadband, encourage interoperability, innovation and faster rollouts.

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Global Power with Regional Strength

The FTTH Council Global Alliance (FCGA) is the platform for cooperation of the five global FTTH Councils. All FTTH Councils share a common goal: the acceleration of fiber to the home adoption. They all act as powerful and independent organizations 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 latest market developments. Joint projects – like this magazine – allow global activities and intercontinental networking.

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