How Copper can be Strategic for Operators in the Ultrafast Broadband Era

By Robin Mersh, Chief Executive Officer of the Broadband Forum

Robin Mersh, CEO, Broadband Forum

Robin Mersh joined the Broadband Forum as Chief Operating Officer in July 2006, and was promoted to Chief Executive Officer in July 2010. Robin has authored many articles and has spoken at and chaired many broadband industry conferences and exhibitions. He has worked in the telecommunications industry for over 20 years, starting at Cable & Wireless and then moving on to BT before meeting his wife and moving to the US in 1999. Robin has worked in business development and alliance management for various OSS software companies in the United States, mainly in network and service provisioning and activation, where he negotiated and managed several large OEM agreements. He is originally from Cambridge in the United Kingdom. He received a Bachelor of Arts degree with honors from Queen Mary and Westfield College, University of London in 1992.

Following the completion of innovative work on the management of FTTdp, Robin Mersh, CEO of the Broadband Forum, explores how operators can leverage and capitalize on existing investment in copper to create a new strategy for the ultrafast broadband era. This strategy is also a key element of the Forum's recently announced *Broadband 20/20 vision*.

Operators and service providers are under increased pressure to provide unlimited ubiquitous, high-quality bandwidth and to stay abreast of new technologies to ensure their networks can keep up with the challenging demands posed by the rise of the "always connected" consumer. However, against this backdrop where the newest ideas are often regarded as the best, an unfashionable but practical solution is emerging as an unlikely champion.

More than a century since it formed part of the earliest telephone networks, copper is again proving its mettle, this time as part of G.fast.

New Service Opportunities

G.fast is the latest generation of DSL technology, as specified by the International Telecommunication Union's Telecommunication standardization sector (ITU-T). By

building on the best aspects of ADSL and VDSL, this new generation technology promises to cost-effectively deliver bandwidth-intensive consumer applications, such as 4K Ultra-High-Definition (4K UHD) and cloud-based consumer applications, to homes worldwide. It is designed to help operators meet broadband targets by expanding the footprint of existing fiber networks and providing gigabit broadband speeds to consumers with greater penetration.

Designed to support Fiber to the Distribution Point (FTTdp) deployments, which bring fiber within 50m to 250m from the customer's premises, G.fast operates over the final copper drop wires between the fiber termination at the Distribution Point Unit (DPU) and the user – enabling users to receive bitrates of up to 1Gbps. DPUs will also be co-located with street cabinets and in above and below ground locations. This dramatically improves the performance of digital transmission over copper telephone wires – presenting operators with an alternative to Fiber to the Home (FTTH) deployments. G.fast can also be thought of as an adjunct and a stepping stone to FTTH. It will play an increasing important role for residential, individual business locations, home workers, business and residential tenants of multi-dwelling buildings.

Existing phone wiring now stands alongside Ethernet and Wi-Fi as an equal but unobtrusive player in the gigabit home.

Market and Operational Considerations

For a long time, FTTH was seen as the 'future-proofed' solution, providing rapid connection speeds and increased bandwidth over long distances. However, in reality the installation and operation costs of FTTH remain far too expensive in many distribution areas, meaning many network operators struggle to implement viable FTTH business models, especially in long-established networks. As a result, practical and economic difficulties of FTTH deployment has given rise to copper extending technologies such as G.fast, with many operators already looking to deploy FTTdp networks using the technology to enable ultrafast broadband through existing copper access. This can provide ultrafast 'fiber-like' broadband at a fraction of the cost – giving operators and consumers the very best of both worlds.

The success of VDSL2 vectoring – which has proven that operators still want to retain copper cabling to prolong the migration to FTTH networks – has further encouraged G.fast developments. G.fast has been designed to co-exist with VDSL and allows operators to employ both technologies in different scenarios, enabling customers to switch between the solutions, in line with enterprising business models.

With approximately 400 million lines of DSL already installed, network operators are keen to maximize the speed and bandwidth of their existing copper networks to remain competitive against the network providers offering full fiber FTTH networks. The cost of deploying FTTdp networks with G.fast is considerably lower than deploying FTTH networks. Furthermore, they provide a better return on investment, allowing operators to both market and deliver ultrafast broadband without the substantial investment of deploying their own, totally new-build, FTTH networks.

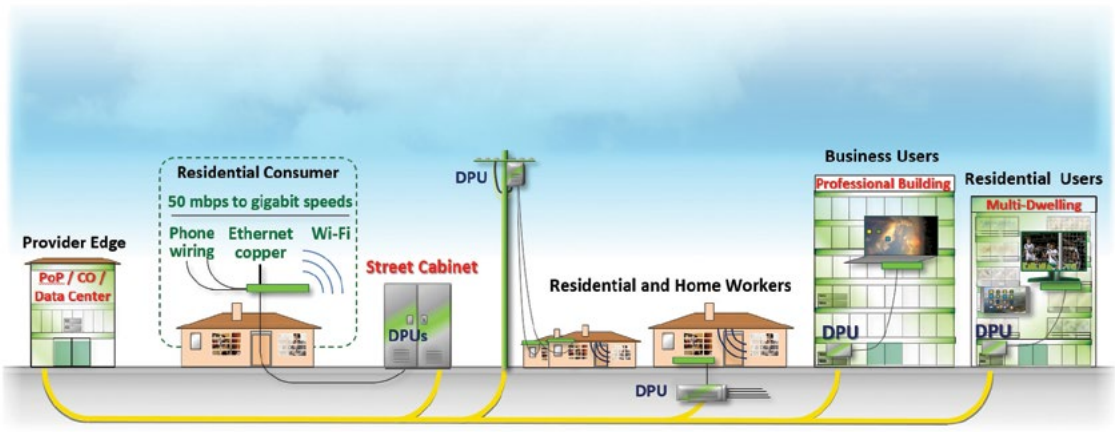
Intriguing New Deployment Options

One of the key things that sets G.fast apart from previous technologies is its flexible use of power sources. Power can of course be provided conventionally at a co-located street cabinet, within or adjacent to a multi-tenant or multi-dwelling building. However, G.fast also introduces the ability to support reverse power using the copper drop wires to feed power from the customer premises to the DPU and is designed to be able to operate with multiple subscribers.

G.fast also has an important role as an adjunct to FTTH in multi-tenant and multi-dwelling buildings since it can now bring gigabit-class services to existing tenants without the need to rewire an entire building. For new business or residential tenants provider-supplied CPE can be supplied even before a G.fast installation is complete making new service introduction invisible to the user.

Unlike ADSL2 and VDSL2 which use Frequency Division Duplexing (FDD), G.fast uses Time Division Duplexing (TDD) which allows the ratio of upstream to downstream data rates to be easily changed as application requirements evolve.

This will become increasingly significant as cloud



networks increase in popularity and low upstream bandwidths begin to cause a bottleneck for users sharing large files. This flexibility enables operators to provide new services for the connected home, such as remote video surveillance, and consumers can tailor their upstream to downstream ratio to best suit their usage. TDD also provides power saving functions for G.fast since many functions of the transceivers can be turned off when there is no data to send.

Reduced OpEx

G.fast technology is designed to work in a customer self-install environment, allowing service providers to avoid the cost and inconvenience of sending a technician to the home. With the simplicity of installation and the very reasonable equipment cost, combined with the savings on power feeding, the financial benefits begin to add up to a very exciting proposition for service providers.

G.fast also supports vectoring, reducing far-end self-crosstalk and interference in order to boost performance. Consequently, G.fast is able to utilize 106MHz of spectrum over the copper pair wiring from existing telephone lines.

While G.fast currently works with voice services, its future use is best suited to Voice-over-IP (VoIP) which is expected to grow in popularity, reducing the use of traditional telephone networks and the need for an analogue receiver.

Accelerating G.fast Adoption

The Broadband Forum has many programs designed to speed up the release of G.fast-based services, including an FTTdp YANG management model which was completed at our last quarterly meeting and has been released exclusively to our members for testing in network equipment. This is the Forum's first software project written in the YANG modelling language and is great news for our members, whether they be service providers, vendors or test houses. By adopting YANG modelling we are accelerating the management of FTTdp; from specification and design into the network, helping to drive open interoperability between different devices. This means service providers can offer competitive ultrafast services enabled by FTTdp and G.fast.

The Broadband Forum is also working on an enhanced FTTdp architecture and has a series of G.fast plugfests starting this month to ensure chip-set interoperability. In addition, it is launching a G.fast Certification Program and a series of standards to define management of G.fast enabled equipment.

All these measures are necessary to not only smooth the way for easy integration of G.fast into already complex network architectures but to maximize interoperability across the world. Interoperability will boost service provider confidence in making the G.fast move and will ensure competitive pricing as they look to deliver sustained profitability while meeting the challenges of the market. The other benefit of interoperability is that it will prolong the life of G.fast in the network.

By enabling operators to deploy ultrafast broadband networks cost-effectively, G.fast unleashes the full potential of existing copper networks. By deploying the technology, operators can extend the life of their existing network infrastructures economically, while boosting broadband speeds. Giving the speed of FTTH without the need for professional installation, G.fast provides a true alternative to fiber all the way based solutions.

For more information visit:
www.broadband-forum.org