Renewing the Value of Copper for Ultrafast Broadband

As operators look to boost their copper deployments, Robin Mersh, CEO of the Broadband Forum, explores how G.fast capitalizes on existing investments

Robin Mersh, CEO, Broadband Forum

The global telecommunications landscape is constantly changing and with the rapid emergence of the Internet of Things, the rise in the number of connected devices and the growing popularity of data-hungry applications, the market is seeing a massive surge in the need for ultrafast broadband. As this demand for greater bandwidth and connection speeds grows, the ability of broadband technologies to evolve to meet this "new age" of broadband is being constantly challenged.

Service providers – both mobile and fixed – are being bombarded from all sides. While shareholders look for maximum profits (many of them also bandwidth-hungry customers themselves!) from their investment, the operators have to maintain and modernize their networks as never before. The range of technologies have never been wider either and they stretch from the new world of SDN and NFV to legacy equipment designed in the days when these operators provided voice services only.

Yet set against this incessant demand – while operators are also fighting off the revenue "leakage" of the OTT 'services' – an unsung hero has emerged once again to help these carriers to survive the latest threat to their operations and their profitability.

That hero is one of the oldest elements of any telephone network going back 100 years. Against all odds, copper would appear to be king once more. Copper in the shape of a solution called G.fast.

The power of G.fast

G.fast is the latest generation of 'DSL' technology as specified by ITU-T. Taking the best aspects of ADSL and VDSL, this new generation technology promises to deliver bandwidth intensive consumer applications such as 4K Ultra High-Definition (4K UHD) and cloud-based consumer applications, cost effectively to homes across Europe and beyond. 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.

G.fast dramatically increases the performance of digital transmission over copper telephone wires. Designed to support Fiber to the Distribution Point (FTTdp) deployments, which brings fiber within as little as 50-200m 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.

As a Fiber to the Home (FTTH) alternative, many operators are already looking to deploy FTTdp networks using G.fast technology, to enable ultrafast broadband through existing copper access. FTTH was seen for a long time as the 'future-proofed' solution, providing rapid connection speeds and increased bandwidth over long distances. In reality the installation and operation costs of FTTH remain far too expensive for a lot of service providers and network operators struggle to implement viable FTTH business models, especially in long-established networks. The practical and economical difficulties of FTTH deployment has given rise to copper extending technologies such as G.fast, which can provide ultrafast 'fiber-like' broadband at a fraction of the price – giving operators the very best of both worlds.

G.fast developments have been encouraged by the success of VDSL2 vectoring, which has proven that operators still want to retain copper cabling to prolong the migration to FTTH networks. G.fast has been designed to co-exist with VDSL and allow operators to employ both technologies in different scenarios and allow 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 100% fiber FTTH network providers. The cost of deploying FTTdp networks with G.fast are considerably lower than deploying FTTH networks and 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.

What's unique about G.fast?

One of the key things that sets G.fast apart from previous technologies is its ability to support reverse power. Unlike ADSL2 and VDSL2, 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.

G.fast uses the copper drop wires to feed power backwards from the customer premises to the DPU and is designed to be able to operate with any number of subscribers. However, G.fast does not always have to use reverse power, it can also be operated by commercial power. One of the big applications for FTTdp with G.fast is in Multi-Dwelling Units (MDUs). In MDUs the serving node might be located in an equipment room in a basement of the building where you have power readily available, and in this case it makes more sense to use commercial power.

G.fast is complementary

The technology is also designed to work well in a customer self-install environment, allowing service providers to avoid the cost of sending a technician to the home, therefore cutting the inefficiency of scheduling a technician to be there at the same time as the customer to let them into the home, as well as and the inconvenience to the customer. G.fast enables services providers to receive the savings of the self-install, the savings of the power feeding and the savings of running fiber to the home for those last 100-200m. If you look at the circuitry involved for G.fast it's very simple and so the equipment cost itself is very reasonable, all of these savings add up to a very exciting proposition for service providers.

G.fast also supports vectoring and VDSL2 technologies to reduce far-end self-crosstalk and interference in order to boost performance. As a consequence G.fast is able to utilize 100 Mhz of spectrum over the copper pair wiring from existing telephone lines – this is particularly impressive when you consider a traditional DSL line uses less than a Mhz of spectrum. G.fast also utilizes an optimized modulation technique, based on that used in VDSL2, and is backwards compatible to future-proof the technology.

G.fast therefore unleashes the true potential of existing copper networks and enables operators to deploy ultrafast broadband networks cost effectively. This extends the life of an operator's existing network infrastructure economically and boosts broadband speeds.

For today, G.fast can work with voice services but it is best suited for the future where traditional telephone networks have been retired and instead everything is done with Voice over IP (VoIP). G.fast will work perfectly in that environment, where there is no need for traditional and analogue telephony any more.

The Broadband Forum has many programs designed to speed up the release of G.fast-based services including an enhanced Fiber to the Distribution Point (FTTdp) architecture, a series of G.fast plugfests starting this month to ensure chip interoperability, a G.fast Certification Program launching this year and a series of standards to define management of G.fast related 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.

Copper has been with us now for more than a 100 years as a core component of the network. Through G.fast could it still be supporting us in another 100?

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