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"How carriers can accelerate growth and profitability with EFM over copper"

DESPITE THE SLUGGISH ECONOMY, research from Vertical Systems Group shows that global Ethernet business services continue to expand and will reach $45 billion by 2016. This is a welcome growth projection, but to capture this opportunity profitably, carriers must evolve their networks and business models. Growing the success of Ethernet services requires a smart business approach—one which not only provides more bandwidth, higher performance and greater availability, but also includes operationalising network efficiencies for wide-scale delivery that can address new service opportunities economically. Carriers must provide bandwidth where and when it's needed, including offering the right customer experience if they are to fend off competition. Some carriers have already gained success by transforming their approach in this way. Belgian CLEC Destiny has rolled out new Ethernet business services that competing incumbents cannot provide. Colt also continues to roll out innovative Ethernet services across Europe, while Cbeyond and Frontier Communications have won successes that have enabled them to expand their U.S. footprints.

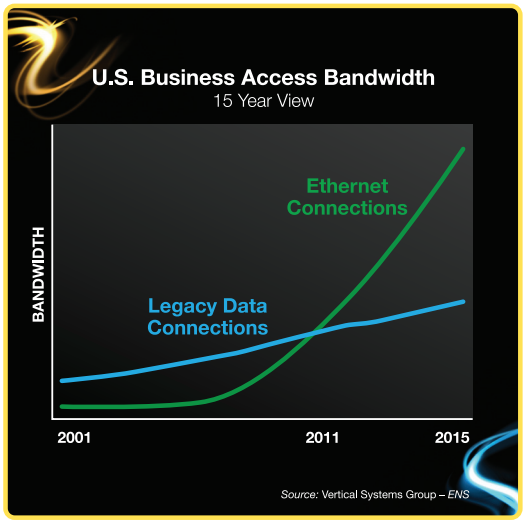
So what do these success stories have in common? Making better strategic use of existing network assets to provide all the bandwidth, performance, reliability and quality of experience required while significantly improving ROI. Specifically, each of these carriers uses advanced Ethernet in the First Mile (EFM) technology to break down former barriers once associated with copper transmission. The result of their leveraging the installed base of copper to offer highly competitive and lucrative Ethernet services provides a quick ROI and leads to increased profitability. (Fig 1)

EFM over copper is just one way to provide access for new Ethernet services. Fibre certainly has its advantages, but building new fibre is typically only cost optimised relatively close to the existing fibre footprint, where easements and permits are easily obtained, and where the bandwidth and scalability requirements warrant. The cost and difficulties associated with deploying fibre has limited its growth and market penetration significantly. Vertical Systems Group reports that after 20+ years of aggressive fibre build out, less than one-third of U.S. buildings have fibre access. In 2011, fibre penetration in Europe was at 21%. Microwave can be useful in delivering Ethernet services. However, licensing, frequency coordination, varying performance between different climates and varying weather conditions, plus attaining and ensuring line of sight over the long-term is challenging. T1/E1 circuits can be used to offer Ethernet services, but they are far from being a cost-effective solution. EFM over copper has many applications. Among its particular strengths is replacing T1/E1's with new Ethernet business services and providing a solution for backhaul applications.

THE NEED FOR SPEED...AND GREATER SLAS

Bandwidth requirements are increasing quickly due to new applications. Erin Dunne, director of research services at Vertical Systems Group, reported in the "Global Ethernet Services Market Update & Outlook" that cloud computing, digital media/content delivery, video, T1/E1 services and mobile backhaul are among the network applications driving the need for speed. Each of these trends presents its own set

Figure 1: The Explosion of Ethernet Connections



of opportunities and challenges, and requires investment in infrastructure with a new set of guidelines to quickly standardise and operationalise delivery.

Carrier Ethernet 2.0 is the next-generation guide for setting up multiple class-of-service definitions, allowing carriers to establish more nuanced Service Level Agreements (SLAs) which are essential to delivering Ethernet business and cloud-based services. CE 2.0 also provides a richer set of management metrics, according to Craig Easley, founder and president of the Carrier Ethernet Academy and longtime contributor to the Metro Ethernet Forum. "Carrier Ethernet 2.0 sets the stage for multiple carriers to exchange Ethernet traffic in a uniform fashion," says Easley. "Enabling a faster time to market, Carrier Ethernet 2.0 gives carriers a leg up on cable companies. It serves as a clearing house that cuts the time for negotiations, service delivery, and provides information on what equipment to buy and from whom."

Prices for U.S. Ethernet services decreased across all applications and port speeds in 2011, according to Vertical Systems Group, so why should carriers invest in legacy infrastructure? "It's about survival," adds Easley. "No one is hitting their numbers, so they need to differentiate against the competition through investment in the infrastructure to deliver a managed service offering, rather than just selling an outdated pipe." Easley suggests that carriers must include operational efficiencies to cut costs, maximize the legacy infrastructure and improve quality of service. (Fig. 2, 3).

MIGRATING FROM LEGACY TO ETHERNET BUSINESS SERVICES

While cost and time to market seem clear advantages of EFM over copper, how is it better than T1/E1 services? Firstly, T1/E1's cannot deliver the bandwidth to offer next-gen business-class and cloud-based services. They cannot scale to provide the necessary bandwidth and SLAs that EFM over copper delivers. Second, when customer demand is below the 500 Mbps threshold—in the sweet spot of 15-3o Mbps—scaling T1/E1's is very expensive. Lastly, T1/E1's don't offer the ability to evolve as customer requirements and new service opportunities dictate.

The savings a CLEC can realise by replacing T1's with Ethernet business services can be as much as 70%. The analysis starts with the cost of the loops to the CLEC, which can be between $50-$150/per month (averaging $100 per month) for a T1 comprising of two copper pairs that deliver 1.5 Mbps. These numbers reflect the legacy cost of T1 circuits, when 1.5 Mbps was considered a fat broadband pipe and could serve the communication needs of a relatively large office. (Fig. 4, 5).

A European CLEC may pay €530/per month for an E1 comprising 2 copper pairs that delivers 2 Mbps. Today, it is possible for the CLEC to lease the copper pairs without paying for the legacy E1 service. Subsequently, they can install EFM over copper to drive copper pairs at much higher speeds and with greater reliability. These EFM-ready copper loops typically cost about €87/per month/per pair, or a total of €175 /per month for 2 pairs. The annual cost per E1 goes down from €6,360 to €2,100—a saving of €4,260/per E1 connection. Therefore, the CLEC saves upward of €426,000 annually by converting 100 E1 circuits to EFM over copper. In both examples, the ROI is typically less than six months.

ETHERNET: A STRESS RELIEVER FOR MOBILE BACKHAUL

Replacing T1/E1's with Ethernet is only part of our story. As a result of the skyrocketing usage of smartphones and tablets, mobile backhaul networks are becoming overloaded. The challenge of providing affordable backhaul is magnified when carriers begin to complement macro cells with a far greater number of small cells, which relieve spectrum constraints and improve quality of experience for subscribers, while providing the operator with a much lower cost basis than they had with macro cells. However, small cells present operators with a whole new challenge: delivering enough bandwidth to the right

Figure 2: Operationalizing T1-E1 Line Replacement for LEC

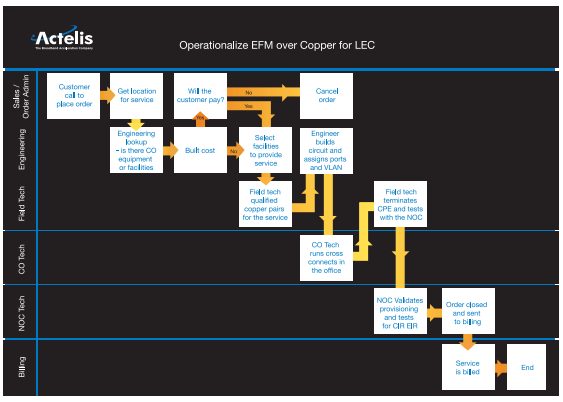
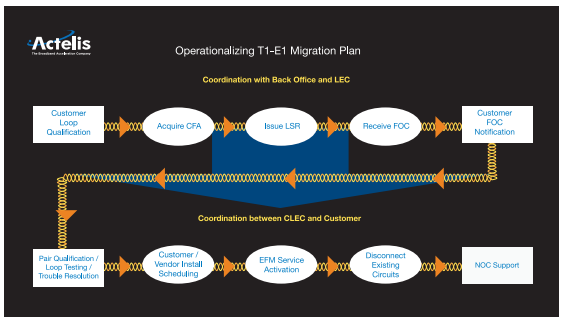


Figure 3: Operationalizing T1-E1 Line Replacement for CLECs



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locations. Small cells will need to be deployed in many areas where the cost of fibre or logistical difficulties associated with providing backhaul bandwidth over microwave is far too high. The near ubiquitous asset of copper is typically far more cost effective and easier to use. Thanks to EFM technology, copper can provide the bandwidth required for many of an operator's small cell needs without compromising performance and availability, while enabling high operational efficiency.

The simple fact is, carriers require a diverse toolkit for their access network. That toolkit will include components of fibre and microwave technologies where they make sense. It will also include an increasing component of EFM over copper solutions. "We expect operators to spend $1.5 billion on bonded-copper Ethernet Access Devices in the next five years, as they increase the capacity to improve efficiency of mobile backhaul networks and business connections," claims Michael Howard, principal analyst and co-founder at Infonetics Research.

New technology is available to help carriers ease backhaul constraints while delivering up to 500 Mbps of bandwidth with extended reach using standard EFM bonding by utilising DMT technology. EFM over copper-based network transport is an important complement to fibre, microwave, and T1/E1's, since it reuses network assets and leverages new technology to provide a whole new level of bandwidth and performance at minimal cost over distance. Building the most profitable network requires a diverse toolkit of access, using each where it is best suited in order to achieve the lowest total cost of ownership. Carriers following this approach will soon find themselves using a much greater percentage of EFM over copper as part of that mix.

Actelis offers a wide range of Ethernet products to help carriers leverage their existing infrastructure, deliver new Ethernet business-class services, and provide efficient broadband solutions for mobile, and DSLAM applications.

Chris Heinemann, Director, Marketing Communications, Actelis

Contact

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Figure 4: T1 Replacement with EFM over Copper

Figure 5: E1 Replacement with EFM over Copper