How Copper Is Enabling More Profitable Services and Networks

More service operators today are beginning to use Broadband over Copper solutions very differently. What has changed in the past year is that more Tier 1 operators are either using EFM over Copper and broadband amplifiers or seriously considering them in major RFPs. Now utilization of broadband over copper is frequently being driven by the desire for strategic mass deployment over time, rather than as a stop-gap measure while waiting for the cost of fiber to prove in.

Why the new interest in copper as a key, long-term part of the network? The reason for the change is simple. Advances in broadband over copper technology now make offering 100s of Mbps of reliable, high performance bandwidth available. By using copper as a complementary part of the access toolkit, operators can help further build upon and augment their existing fiber and DSLAM assets. Broadband over Copper provides bandwidth where it is needed more quickly and cost effectively, with lower TCO than fiber or microwave… and makes it possible for service operators to land new customers, transition from less profitable to more profitable services, sell more bandwidth, and enable new strategic opportunities.

Copper is not a replacement for fiber or DSLAMs, it is a complement to them. The access toolkit has to be diverse now that operators are expected to take more bandwidth everywhere throughout the metro. But copper is the key element in that toolkit that is the secret that cost optimizes new builds for outdoor small cell and WiFi backhaul, Business Ethernet services for SMEs, and residential triple play services. Because only by leveraging the existence, ubiquity, and cost and time to market advantages of copper fully can the network truly be optimized for these applications.

Go Further **Extending Reach**	• More coverage • More customers • More revenues - additional services; EoC replacing EoTDM • Faster ROI
Go Faster **Expanding Bandwidth**	• More bandwidth per service, scalable • More revenues • Multiple customers per single EAD • Additional applications • Greater future scalability
Lower TCO **Higher bandwidth per pair**	• Less OpEx on leasing copper • Less CapEx on equipment • Lower TCO , OpEx • Smaller CPEs (Less $) • Higher customer density in CO
Carrier Class Resiliency & Reliability	• Higher QoE • Higher service availability • High robustness (noise environment) • Highly predictable & consistent performance

Here is why:

Residential Broadband

In residential broadband, operator interest in VDSL and vectoring are at an all-time high. But to get enough bandwidth out of VDSL, they have to push DSLAMs closer to customers and will more typically do vectoring from a cabinet rather than CO, as at a cabinet cable size is manageable and only one vendor's DSLAM is involved.

This works – but also poses a few problems. Push mini DSLAMs very close to customers, and you are likely buying that DLSAM at a higher cost per port, and you have greater costs in terms of site acquisition and the need to trench fiber over greater distances, plus you need more cabinets or pole mount, more backhaul links, and a lot of engineering and CapEx. The trenching cost of the fiber alone can make this approach unattractive.

However, by augmenting the distance capabilities of existing DSLAMs with EFM (Ethernet First Mile) over Copper, operators design a significantly more efficient access network.

- Complement existing DSLAMs with EFM over Copper and Broadband Amplifiers to gain greater reach and rate and enable greater port utilization on existing DSLAMs.
- The performance benefits of broadband over copper also enable attaining bandwidth and scalability targets without DSLAMs having to be located quite so close to customers, which enables purchasing somewhat larger and more cost efficient DSLAMs, reducing fiber trenching, and creating larger CSAs.
- Customers in both densely and sparsely populated neighborhoods can be served
- Time to market for achieving the next-gen high speed broadband rollout is reduced
- CapEx investment required is minimized
- ROI is increased
- More service is sold
- Regulator objectives are met

For outdoor small cell applications, broadband over copper is equally important.

Operators need to upgrade their networks proactively to ensure their own customer retention while trying to lure customers away from competitors while maximizing their revenue potential. But they need bandwidth exactly where they need to place the small cell, not where it is easy to provide it – and they need that bandwidth to be cost effective.

- Copper is already available in most locations, and broadband over copper provides minimized up front cost, is extremely fast and simple to deploy, and is inexpensive compared to running new fiber
- Copper does not have to engineered to the lowest common denominator of performance under inclement weather, and is not limited to line of sight – which can be difficult to attain at street level

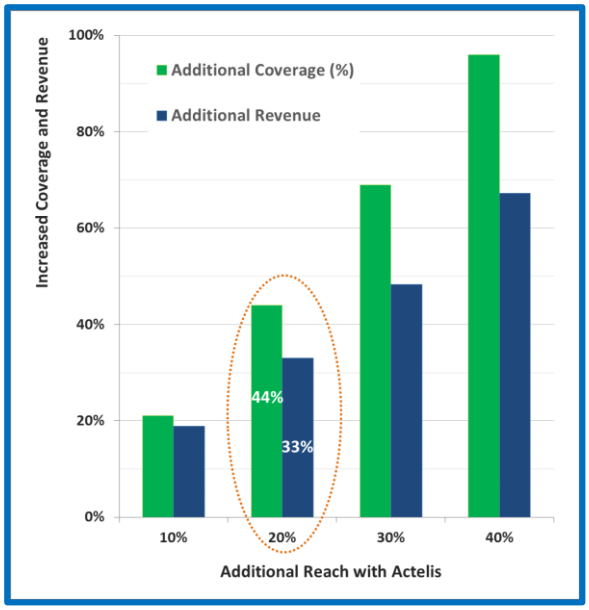
WiFi Backhaul

- WiFi is being offered almost everywhere today, and the NxE1/T1 that is very often used to backhaul it will not scale as needed very cost effectively any longer.
- The distances involved often make the cost of running any new fiber to reach these hotspot locations prohibitive, given the amount of bandwidth required
- Line of site on city streets outside of city centers can be extremely difficult to obtain and maintain over time
- Roof rights acquisition can be costly and difficult, and getting access to rooftops can be difficult.

Business Ethernet to SMEs and Bandwidth to the Building

Every service operator knows that they've been losing business to new competitors – often cable companies – because they cannot provide scalable high performance Ethernet over NxT1/E1 any longer, and the cost of fiber is prohibitive. Broadband over Copper is best for this application because:

- Solutions can be provided over VDSL2 or G.SHDSL, using the appropriate number of pairs (up to 8 with VDSL2, or up to 16 with G.SHDSL and up to approximately 30 Mbps per pair or 15 Mbps per pair, respectively)



- Broadband over Copper eliminates the huge trenching costs and delays of running fiber
- A "Bandwidth to the Building" strategy enables operators to sell more efficiently into customers and leverage the CapEx and OpEx cost synergies afforded by common CPE

Cloud Services

Cloud services have equal appeal to all customers, but maximizing Cloud service revenues – whether they come from the operators' own services or from services offered by a partner with whom the operator has a resale agreement – requires getting enough high performance bandwidth out to the 10s of millions of small and medium enterprises on each of the developed continents that will buy them. In this case, broadband over copper is a key enabler of revenues that go well beyond transport.

Conclusion

These are just a few examples of how copper is optimizing the business model for operators wanting to gain important new customers and services to grow revenues.

Copper will not dominate every application or customer. But because Actelis has made copper a carrier class access media that delivers high performance services, and because those high quality services can be rolled out more quickly and cost effectively using copper, what it takes to optimize the access network now has changed from the way networks were built in the past.

Today, only by using copper wherever the 100s of Mbps it can offer, and its high performance and availability meet the need, can an operator truly optimize their competitiveness and ROI.

For outdoor small cell, that will average at least 20-30% of installations. For reaching WiFi hotspots, copper will be needed closer to 45% of the time. And for small and medium enterprise business Ethernet services, as NxT1/E1 sunset occurs copper will soon become the dominant access technology. Not just next year – but for the next decades.

Why such a change in thinking in such a short time? Because Actelis' market-leading advances in Coordinated Calibration, Dynamic Crosstalk Cancellation, innovative dynamic spectral shaping techniques, and use of highly reliable analog Broadband Amplifiers and Dynamic Rate Boost technology have made reliable, high performance, and scalable transmission over copper a reality.

Copper is and was only as good as the electronics on the end. It was always potentially an extremely good transmission media – it just needed a forward thinking company like Actelis to develop the electronics that would unlock its full potential.

Now that this has happened, copper has become a strategic asset that is the key to reaching old and new customers and locations that are scattered across the metro to offer more than enough high performance bandwidth to meet current and future the needs for important applications that represent significant operator revenue opportunities.