

Broadband Over Copper



Preservation of Copper = Expansion of
Broadband Competition and Vendor
Innovation

Copper Loops Represent the Most Expedient and Ubiquitous First-mile Broadband Deployment Medium

- FCC speed definition in USF/ICC Order: “...actual speeds of at least 4 Mbps downstream and 1 Mbps upstream...”
- Current copper technology provides for symmetrical speeds at orders of magnitude larger than the FCC’s requirement. Using copper loop configurations including single-pair, bonded-pairs and binder-group technologies, speeds up to 800Mbps at distances up to 65,000 ft. are achievable.

http://www.positronaccess.com/product_catalogue1.php?c=52

Copper Loops Represent the Most Expedient and Ubiquitous First-mile Broadband Deployment Medium

- More than 100 Million RBOC Access Lines in service in 2007 (ARMIS) representing approximately:

655 Terabits/s of broadband access capacity

>10 times the average transport rate consumed by the entire Internet (61.263Tb/s) – Cisco VNI

- This figure is calculated using a very conservative 6Mb/s average achievable speed per pair

$$6\text{Mb/s} \times 109,189,077 \text{ loops} = 655 \text{ Tb/s}$$

and does not include consideration of the fact that most US households are served with three copper pairs, not just one, as well as fact that copper is deployed to more than 109 million locations.

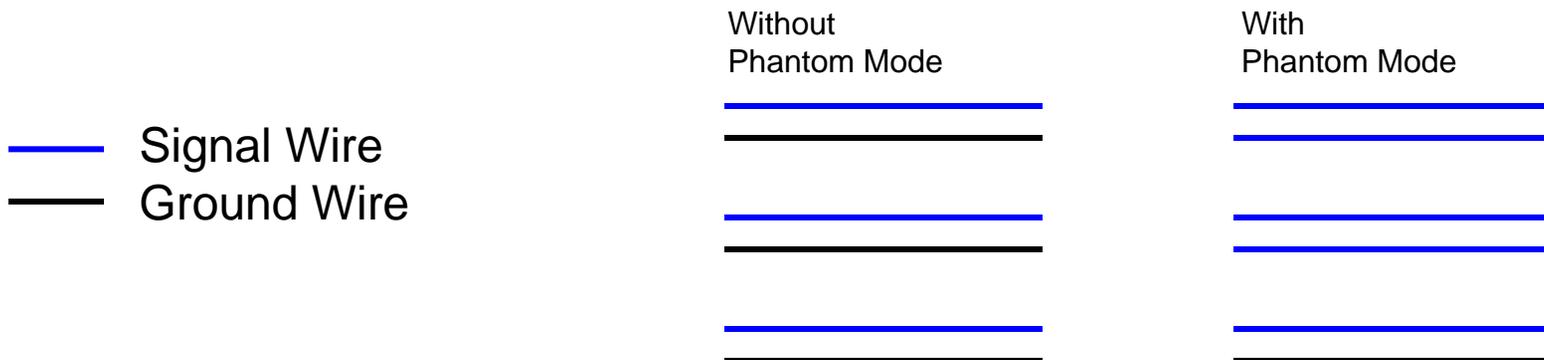
The Strategic Relevance of Copper-based Broadband Deployment is Driving Vendor Innovation *(Current Technology)*

- Pair Bonding
 - Higher aggregate speed to customer by using multiple copper pairs (US households average 3 deployed pairs)
- Vectoring
 - Cancels interference between DSL circuits in binder groups using varying technologies and deployment configurations to increase aggregate speed

The Strategic Relevance of Copper-based Broadband Deployment is Driving Vendor Innovation *(Emerging Technology)*

- Phantom Mode

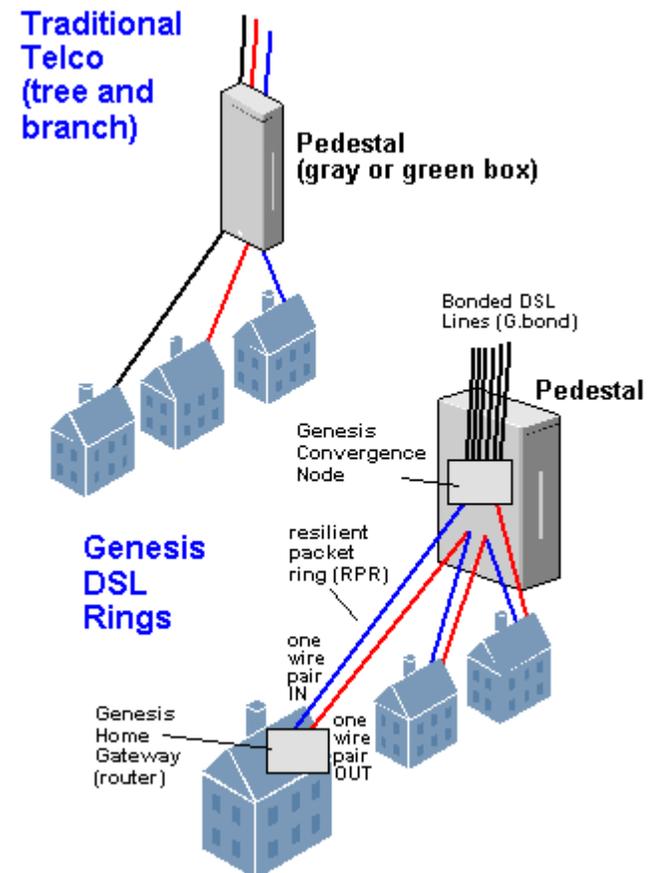
- Increases speed of multiple-pair bonds even further. In a copper pair, one wire is a ground wire and one a signal wire. In a bonded-pair configuration, Phantom Mode converts all but one of the ground wires into signal wires, thus vastly increasing capacity.
- Example: US Household served by 3 copper pair yielding 6Mb/s per pair totaling **18Mb/s** without Phantom Mode.
- Phantom Mode can yield the bandwidth of 5 pairs (5 signal wires x 6Mb/s = **30Mb/s**, and one ground) from the same 3 copper pairs.



The Strategic Relevance of Copper-based Broadband Deployment is Driving Vendor Innovation *(Emerging Technology)*

Genesis Technical Systems
Corporation –

Bonded DSL Rings provide up to 400 Mbps transmission that is shared among some 15-25 households that are within 4.3 miles (7 km) from the central office. It enables telcos to implement high-speed DSL service without the huge expense of laying optical fibers, **especially in rural communities.**



The Strategic Relevance of Copper-based Broadband Deployment is Driving Vendor Innovation

- In 2011 Copper-based products account for 30% of the Carrier Ethernet Access Devices market which grew 17% in 2011.

(2012 – Infonetics Research Report <http://www.infonetics.com/pr/2012/2H11-Ethernet-Access-Devices-EADs-Market-Highlights.asp>)

- Actelis (Market Leader)
- Overture (Bought EFMC vendor Hatteras Networks)
- Positron (800Mb product up to 65,000 ft.)
- Genesis Technical Systems Corporation (Rural DSL Rings)
- Alcatel Lucent (VDSL2 Vectoring to 100Mb)

The Commission's Current Rules Deter, Rather Than Promote, "maximum utilization of broadband infrastructure."

- The foregoing technologies can be deployed by an entrant, PROVIDED that it has stable and predictable access to copper.
- The Commission's rules do not provide a stable planning horizon because the copper can be "retired" and made unavailable for use by competitors.
- The Broadband Plan, Recommendation 4.7: The FCC should comprehensively review its wholesale competition regulations to develop a coherent and effective framework and take expedited action based on that framework to ensure widespread availability of inputs for broadband services provided to small businesses, mobile providers and enterprise customers.