

## Support Ubiquitous Bandwidth Everywhere It's Needed on Your Connected Campus with Reliable and Cost Effective Ethernet over Copper

Today's universities, colleges, and K-12 school systems all need reliable, high speed bandwidth everywhere. WiFi has become an essential tool for enhancing productivity and communication all over the campus, while the increasing use of surveillance cameras throughout the grounds is critical for reasons of safety and security. Similarly, In K-12 school systems, adequate surveillance is essential to ensure safety and security on parking lots, playgrounds and athletic fields as well as within buildings, while additional WiFi can be useful for providing connectivity to temporary classrooms or athletic fields. With K-12 schools, sometimes just getting adequate broadband access to the school itself can be extremely difficult and expensive, depending on the school's location.

Educators need more bandwidth for both access and transport, but fiber is frequently not available everywhere it is needed, nor is it quick or affordable to build it out to reach all the diverse and sometimes remote locations where broadband is required. Actelis Networks has the answer: reliable, high speed broadband over copper.

Actelis' EFM over Copper solutions utilizing "bonded copper" technology are field proven and create reliable, high speed transport over widely available copper twisted pairs. Up to 100s of Mbps can be achieved for broadband access, transport, or as a diverse access or transport media. Actelis solutions can also provide 10s of Mbps of bandwidth, extend reach to 10 kft and beyond, and support a variety of network topologies. With Actelis, get reliable, high speed broadband at any of the diverse locations where you need it for HD surveillance cameras or high speed backhaul for WiFi base stations. Actelis gets the bandwidth there more quickly and cost effectively, flexibly providing all the bandwidth you need over an all-copper solution, using copper as a complement and extension of bandwidth off of existing fiber network, or as a temporary solution with a smooth and easy migration path from copper to fiber wherever and whenever needed.

### Actelis networks portfolio offers:

- **ML2300 / ML230 aggregation Switches** –Enable cost effective aggregation of multiple bonded G.SHDSL high speed links. Supports point to point, point to multipoint, drop and continue and ring topologies bonding up to 32 pairs per link of G.SHDSL
- **ML600/ML700 advanced Ethernet Switches** – Offer advanced high speed Ethernet capabilities over a bonded link of G.SHDSL over 2-16 pairs (ML600) or VDSL over 2-8 pairs(ML700)
- **ML684D advanced Ethernet switch** – Enable deployment in demanding locations with extremely compact , fanless and environmentally hardened units supporting point-to-point, ring, and drop and continue topologies
- **XR239 Repeater** – Extend the reach and rate of bonded G.SHDSL links, 10 kft and beyond.
- **VBA/ABA Broadband Amplifiers** - Extending reach and rate of bonded VDSL/ADSL links.
- **Flexible enclosures** for installation on Poles, Wall mount

## High speed Ethernet access using Ethernet over Copper

**Objective:** Get your service operator to offer high speed Internet access for data voice and video at a fraction of the cost, time and complexity needed to run fiber.

- Examples:**
- High Speed connectivity to
    - Neighborhood schools with no access to fiber
    - Regional schools in the country with no access to fiber

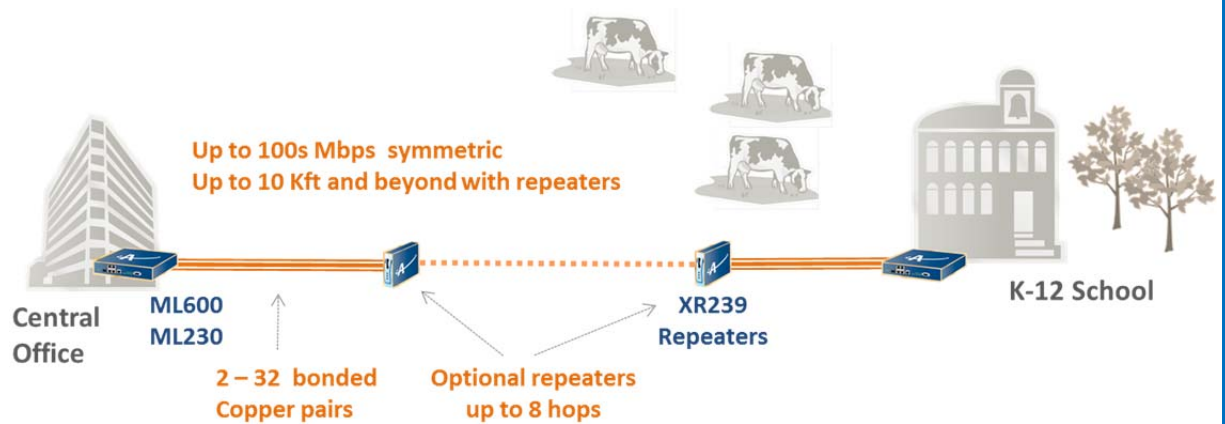


Figure 1: Neighborhood schools with no access to fiber

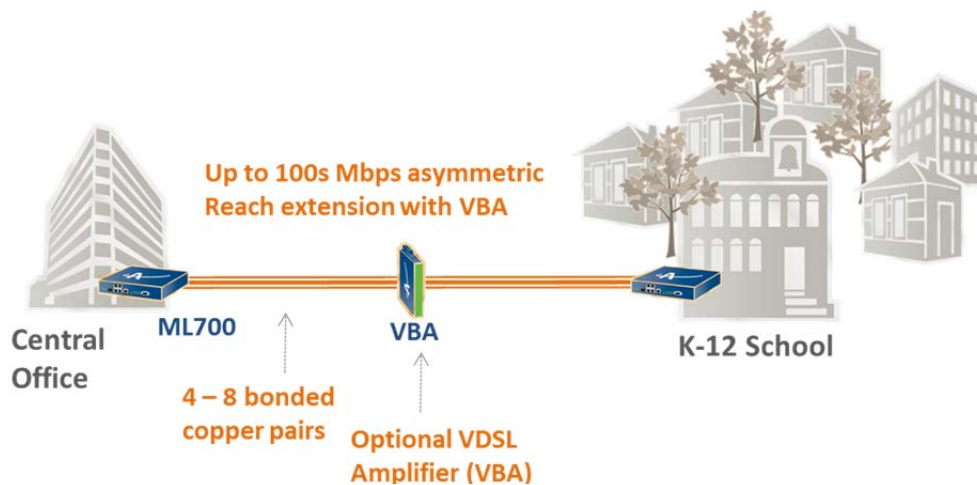


Figure 2: Regional schools in the country with no access to fiber

## High speed WiFi Backhaul using Ethernet over copper

**Objective:** Enable wider WiFi coverage, higher speed connectivity, and enhanced availability by providing high speed backhaul also for locations that cannot be reached quickly and cost effectively with fiber.

- Examples:**
- Greater WiFi coverage for
    - Athletic fields, parks
    - Parking lots, bus stops
    - Dorms, temporary class rooms

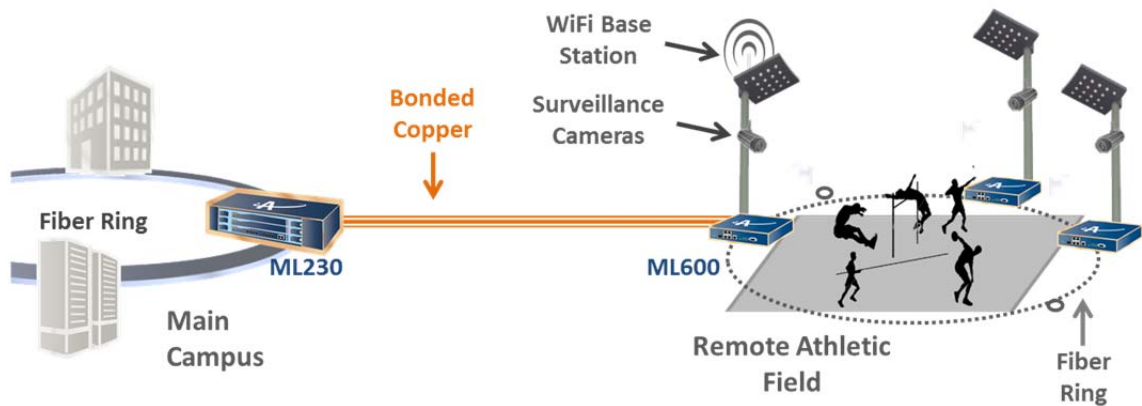


Figure 3: WiFi coverage and enhanced surveillance for remote athletic fields

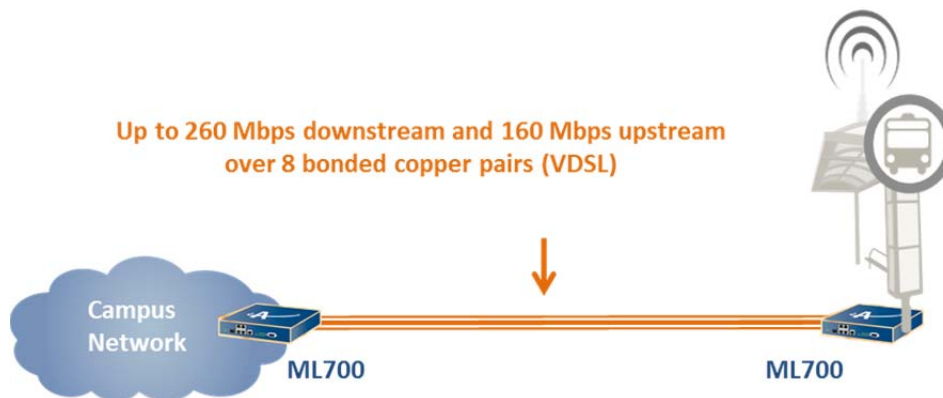


Figure 4: WiFi coverage at bus stations

## High speed Ethernet backhaul supporting the escalating demand for enhanced campus-wide surveillance

**Objective:** Transport of HD video from multiple cameras and smart sensors back to a central monitoring center to allow for higher security and safety.

- Examples:**
- HD cameras distributed all around campus and on emergency poles
  - HD cameras within/around a building/warehouse, dorms along with advanced sensors
  - HD cameras at a remote parking lot within a campus
  - HD cameras at a remote athletic gym

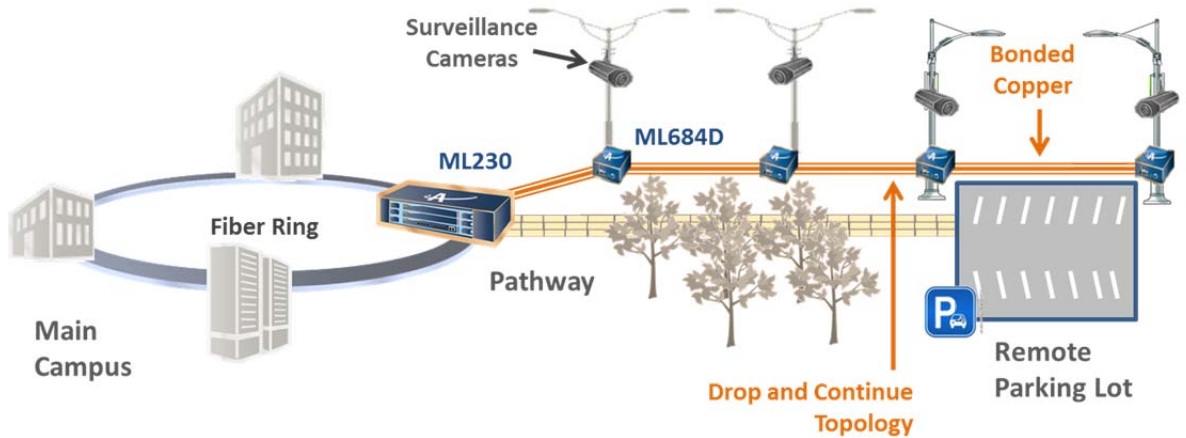


Figure 5: Enhanced Surveillance for a remote parking lot

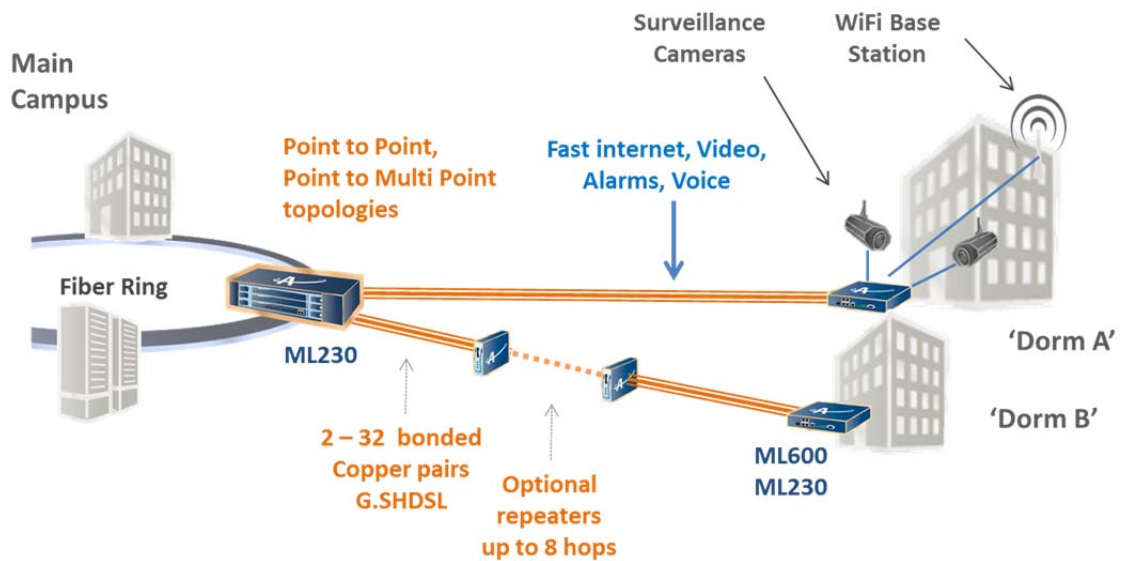


Figure 6: Enhanced surveillances and WiFi coverage around the Dorms

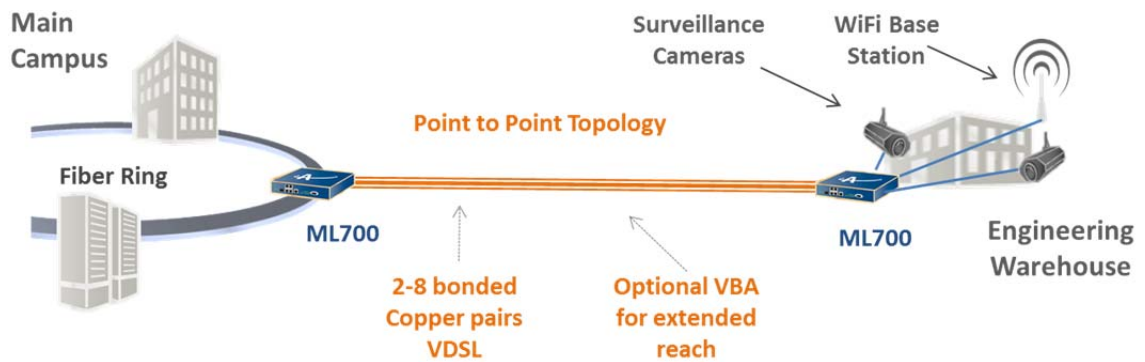


Figure 7: Enhanced surveillance and WiFi coverage for a warehouse

## Actelis' Solution Advantages and Benefits

<b>High Capacity Bandwidth well over 100 Mbps</b>	<ul style="list-style-type: none"> <li>Bonding 4-32 pairs with G.SHDSL - <b>Up to 400 Mbps</b> over 32 pairs, Up 120 Mbps over 8 pairs</li> <li>Bonding 4-8 pairs with VDSL2 - <b>Up to 260 Mbps</b> DS over 8 pairs</li> </ul>
<b>Reliable, Cost Effective, Quick to Deploy High Transport Capacity</b>	<ul style="list-style-type: none"> <li><b>Link performance optimization</b> 100s of Mbps per link; Field-proven reliability utilizing multiple pairs, requiring less capital and time to deploy than fiber.</li> </ul>
<b>Flexible Various Topologies Symmetrical or Asymmetric Backhaul</b>	<ul style="list-style-type: none"> <li>Point-to-point, Point-to-Multi-Point, Drop and Continue, Ring</li> <li><b>Bonded G.SHDSL</b> - symmetrical transport for medium to very long reach. <b>Bonded VDSL2 (DMT)</b> - asymmetrical transport maximizing downstream bandwidth, typically used for short to medium reach.</li> </ul>
<b>Low Latency and Jitter</b>	<ul style="list-style-type: none"> <li>Suitable for demanding applications including video</li> </ul>
<b>Flexibility</b>	<ul style="list-style-type: none"> <li>Cost optimized choices of copper and fiber solutions; ability to migrate from copper to fiber when and if needed without changing hardware</li> </ul>
<b>Extended reach</b>	<ul style="list-style-type: none"> <li>8 repeater hops per G.SHDSL bonded links – 40 Mbps / 45 kft - 26 AWG, 70 Kft -22 AWG</li> <li>VBA/ABA per VDSL2/ADSL links</li> </ul>
<b>Flexible and Easy Installations</b>	<ul style="list-style-type: none"> <li>Compact for cabinet installation, IP68 enclosures for Wall/pole mount</li> </ul>
<b>Remote Powering option</b>	<ul style="list-style-type: none"> <li>Remote express powering over copper pairs, local AC or DC powering options</li> </ul>
<b>Flexible interfaces</b>	<ul style="list-style-type: none"> <li>Optical SFP ports, 6 10/100/1000base-T interfaces (varies between models)</li> </ul>
<b>Comprehensive Management</b>	<ul style="list-style-type: none"> <li>Actelis MetaASSIST™ View and EMS management solutions</li> </ul>
<b>Purpose Build for Task</b>	<ul style="list-style-type: none"> <li>Options include compact, fanless, environmentally hardened units</li> </ul>