

# ***A New Network Paradigm***

## ***Cutting Cost, Space & Energy Use***

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When Planning a Local Area Network (LAN), the system administrator or the IT team, needs to pay attention on various aspects. First, they must stay up-to-date technologically, in terms of network speed, capacity and functionality. At the same time, they have to control both upfront and long-term LAN costs. Finally, they have to figure out a way to achieve those objectives while also complying with a global mandate to trim energy consumption. To list it down briefly, they need to keep the following things in mind while planning out the network:

- Scalability
- Availability
- Redundancy
- Manageability
- Security
- Convergence
- Interoperability
- Intelligence
- Future safe investment
- Green technology
- Penta-play capable (data, voice, video (Cable TV, surveillance & video communication), building automation & wireless
- Low CAPEX and
- Low OPEX

That's a tall order. But customers can now achieve these goals by deploying an advanced GEPON solution, based on gigabit Ethernet passive optical networking (GEPON) technology. The solution delivers a "70-80-90" set of benefits: reduce capital costs by up to 70%, reduced power consumption by up to 80%, and shrink the required floor, rack and closet space by up to 90%.

In the past, all GEPON solutions were created for the residential market for FTTH networks by service providers. However, now ZyXEL's R&D and customization of the technology to suite the need of of campus network, today we are using the same technology not just for FTTH, but for FTTB (Fiber-to-the-building), FTTF (Fiber-to-the-Floor) and even FTTN(Fiber-to-the-node). The ZyXEL GEPON solution is being widely used

to today even in the campus wide networks, which was conventionally deployed purely on a switching solution.

An GEPON is a Layer-2 transport medium, built with PON technology and fiber-optic cabling, which provides converged video, data and voice services at gigabit speeds over a single strand of fiber to end-users. Compared with legacy active-Ethernet solutions, a GEPON dramatically reduces electronics and cabling requirements. The PON cabling infrastructure supports bandwidth of more than 50 terabits per second (Tbps), and the single-mode fiber extends the LAN reach up to 20 kilometers without signal regeneration.

### **Costs of Active-Ethernet vs. GEPONs**

So how does a GEPON solution compare with the widely deployed active-Ethernet LAN architecture? Cost is one differential. In one fiber-to-the-desk (FTTD) LAN serving 2,000 users, the capital expenditure (CapEx) cost of building an active-Ethernet solution is in excess of \$1 million. By contrast, a GEPON would save more than the 70%. In terms of power usage, the GEPON is significantly "greener." In the 2,000-user example, active-Ethernet consumes more than 10 watts per user, where GEPON consumes less than 2 watts per user.

Based on the US Department of Energy's estimated 2009 commercial rate of 10.5 cents per kilowatt hour, the GEPON solution achieves a power consumption savings of more than 80% over the active-Ethernet LAN. Comparing annual operating expenditures (OpEx) for utility costs, the GEPON saves \$72,000 versus the active-Ethernet LAN.

A typical legacy active-Ethernet LAN serving up to 2,016 end-users requires 90 rack units. And because most active-Ethernet LAN switches occupy one rack for the switch, and two additional racks for running the large bundles of copper cables, a 2,016-user active-Ethernet LAN would occupy 18 equipment racks. In Contrast that with a scenario in which a GEPON serves

up to 2,048 optical network units (ONUs) and 7,700 end-users. Thanks to the OLT's 90% greater density, this solution requires only 1 equipment rack and 9 rack units.

**Eliminate Distance, Eliminate Costs**

Another significant benefit provided by a GEAPON is the fact that it requires fewer communications closets and, in some cases, eliminates them altogether. As a result, an agency not only "recovers" physical space but also cuts expense by eliminating unnecessary communications closets. Further savings are realized by reducing excess network equipment. Given the 100-meter distance limitation on Category 3/5/5e/6 cabling in the active- Ethernet LAN, an agency must install repeaters or switches across the building or campus. The single- mode

fiber in the GEAPON, however, can reach up to 20 kilometers. This enables a customer to:

- Reduce or eliminate repeaters, switches and communications closets.
- Deploy an OLT in a single, central location.
- Run links from that lone OLT to all end-users in the building and/or across the campus.

Thus by replacing their legacy LANs with optical solutions based on GEAPON technology, military and civilian customers can readily achieve their overriding LAN objectives. This next-generation technology delivers the necessary speeds, capacity and functionalities. It controls both near- and long-term CapEx and OpEx. And it complies with the government's "go-green" mandate.