

A New Chapter For San Diego Central Library

A new, state-of-the-art library selects GPON technology for its local area network and is rewarded with energy efficiency and high performance.

By Debi Preece ■ *Vector Resources Inc.*

Amid much fanfare, the city of San Diego, Calif., is building a new central library that is slated for completion in the summer of 2013.

This is not a standard brick or stone building with an imposing façade, enormous reading rooms filled with heavy oak tables and long, dark rows of books. San Diego's New Central Library is a 21st-century sensation. Unique features include a three-story domed reading room, a 9,000-square-foot-plus children's library, a nearly 4,000-square-foot teen center, an outdoor plaza and café, an inviting coffee bar, a 333-seat multipurpose room and much more.

The new library will also make available more than 400 public computers, up from about 80 in the existing facility. In addition, the library will offer free high-speed wireless access, allowing visitors to connect their laptops and other devices to the Internet. Each year, more than 1.6 million people sign up for Internet use at the library.

The current library offers – and the new library will provide – online library catalogs and more than 60 online databases. Patrons use their library cards to access the online tutoring program Live Homework Help and to download audio books, e-books and videos that they can play on a variety of devices.

The library also offers services for patrons with disabilities that include TTY/TDD reference services, print magnifiers, low vision assistance computers, developmental disabilities assistance computers and mobility impairment assistance computers.

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As with most public projects today, minimizing energy costs and the environmental footprint is a must. Reducing energy costs is of particular concern, as it frees up funds for other activities. Library officials have submitted the new building for Silver LEED certification.

THE DEVIL IS IN THE (TECHNICAL) DETAILS

The network architecture also represents new thinking. Powering the technology center and other resource facilities is GPON architecture, which is traditionally used in IP-based telecommunications networks. When it was proposed, library officials immediately grasped the potential GPON offered to help achieve energy efficiency and performance goals.

As Deborah Barrow, the director of the San Diego Public Library, put it, “The New Central Library is eager to do [its] part to save energy by upgrading to newer technologies, especially when these new technologies also provide improved access to information.”

Because a GPON router does not require electrical power between the main

equipment room and an end user, there are fewer network components that generate heat, which reduces or eliminates the need for air conditioning in server rooms. In addition, GPON potentially removes the need for intermediate distribution frames (IDFs) and the closets or enclosures that encase them.

GPON brings bandwidth of up to 2 Gbps to library computers as well as to laptops and other devices that patrons bring in. The combination of single-mode fiber and passive splitters gives library IT teams a future-proof architecture.

From an investment perspective, GPON boasts a seven- to 10-year life cycle versus three to four years for traditional active hardware. The GPON solution is expected to consume 50 percent less power than traditional active LAN equipment. It will also consume 40 percent to 60 percent less floor and rack space. Furthermore, GPON eliminates the EMI radiation associated with copper cabling.

DEPLOYMENT CHALLENGES

GPON is based on laser signals that can run many kilometers without significant

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PASSIVE OPTICAL LAN DEPLOYMENT

attenuation. Because the library does not require extended run lengths of fiber, equipment manufacturers and installers had to ensure the architecture did not run too “hot” off a fiber signal into the equipment. The team had to make certain the signal was attenuated sufficiently.

The library’s network architecture begins at the optical line terminal (OLT), where the city’s fiber network connects to the library. From there, 16 fiber strands fan out to IDFs and fiber splitters. From each splitter, 32 fiber strands connect to optical network terminals (ONTs) fastened to the undersides of tables around the library. Four fiber strands run from each ONT to connect to four computers or other end-user devices. These ONTs are active, meaning they have to be powered and secured.

With GPON, active (powered) equipment is located at the endpoints – the ONTs – and the interconnects between the OLT and the ONTs are passive. This architecture differs from an Ethernet environment, in which the endpoints (typically RJ45 jacks) are passive and the interconnects are active.

Because the interconnects in GPON architecture are passive, IT teams must provide power and security only at the OLT and the ONTs. With active Ethernet, each interconnect requires power and security.



The dome of the San Diego New Central Library has been completed, and the building will open in July 2013.

Photo credit: San Diego Public Library Foundation

GPON architecture allows library managers to expand the network easily, as the existing OLT can support more ONTs than are deployed currently. In addition, if the city deploys fiber outside city limits, library managers could extend the GPON network to other locations, thus expanding the reach of its current network. Expansion costs would be lower because a GPON network is passive to the endpoint, and no power would be required along the expansion route.

GPON also facilitates network management. IT teams manage all as-

pects of the network through the OLT; the ONTs are relatively dumb devices. Teams simply define access rules for each OLT port and define how many splitters and endpoints will be connected.

Finally, the OLT includes built-in power backup so that managers can safely shut down the network in case of a power outage. The OLT includes an AC/DC rectifier so that AC power entering the unit is converted to DC to charge internal batteries and then converted back to AC when connected to the OLT components within the unit.

PROJECT DETAILS

Vector Resources collaborated with **Tellabs** and **TE Connectivity** to deploy the GPON system in the San Diego Central Library. Vector personnel contributed technical and systems integration expertise as well as experience working with the San Diego public sector. Vector was also experienced with E-Rate, the federal program that provides discounts to schools and libraries to secure affordable telecommunications and Internet access and that allows the library to maximize the benefits of the program. The E-Rate program is expected to provide reimbursement for up to 80 percent of the cost of this optical LAN project.

Tellabs, which provided the optical LAN equipment, has been developing PON equipment for a decade. Charles Stone, vice president of government systems at Tellabs, notes that optical LAN “is an increasingly popular solution for architects and contractors attempting to secure LEED and related certifications as well as drive down long-term total cost of ownership.”

TE Connectivity, a leader in copper and fiber optic connectivity, supplied the cabling and connectivity expertise for the project. Gary Eifert, account manager for TE Connectivity, says the robust and scalable cabling solution will meet the library’s “immediate and foreseeable future needs.”

NEW THINKING FOR A STATE-OF-THE-ART FACILITY

The new library is a state-of-the-art facility, and some may say that GPON, which has been widely used since 2008, is not a state-of-the-art technology. However, deploying GPON as an indoor network architecture with the benefits of lower costs, a longer life cycle and improved performance for library patrons certainly falls in the category of innovatively applying an existing technology in a new application.

For the IT team at any organization that is eager to achieve improved performance, reduce costs, potentially qualify for LEED certification and enjoy lower total cost of ownership, GPON is a network technology to consider. GPON is proving to be a valuable option for many situations and budgets. ♦