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SUCCESS STORY/
Telecommunications Industry Association (TIA)

The Project Snapshot

CommScope Simplifies Passive Optical Network Deployment for the Telecommunications Industry Association (TIA). The Telecommunications Industry Association (TIA) is the leading trade association representing the global information and communications technology industry through standards development, policy initiatives, and market intelligence. With support from hundreds of members, TIA enhances the business environment for companies involved in telecom, broadband, mobile wireless, information technology, networks, cable, satellite, unified communications, emergency communications and the greening of technology.

Opportunity:

Build a state-of-the-art network with performance, scalability and environmentally-friendly characteristics reflective of the TIA's industry leadership and progressive philosophy.

Why CommScope Optical LAN Solution?

CommScope was selected because of its leadership position in the network cabling and connectivity marketplace. CommScope's advanced Optical LAN solution is part of a comprehensive portfolio of fiber and copper solutions that support the converged architecture needs of a wide range of customers.

Solution:

- 72-port rapid fiber distribution hub (iFDH)
- Rapid distribution terminals (RDT)
- Pre-terminated singlemode fiber cable assemblies
- SC angled physical contact (APC) connectors
- Fiber cassettes with 12-fiber MPO adapters
- Fiber panels (TFP)
- Mini plug-and-play passive fiber splitter modules
- 1134 multiservice access platform (MSAP) OLT (Tellabs)
- ITU-T G.984-compliant ONTs (Tellabs)

Results:

The TIA is now optimized for high performance and high bandwidth applications with a state-of-the-art, scalable and 'green' network infrastructure from CommScope.

"As a standards organization, we are at the forefront of technology, and we realized the PON was one of the latest technologies to consider."

~ Tony Zarafshar
IT manager for TIA

Deploying a Passive Optical Network in a Standards-Based Enterprise Environment

Once perceived as a niche application for highly secure government installations, passive optical networks (PONs) are now gaining traction in the premise enterprise environment as a means to move fiber closer to the end user while speeding network deployment, saving space and providing a greener, more sustainable infrastructure.

PONs are quickly making their way into a variety of high port-count environments, including hospitals, universities, campuses, hotels, casinos, high occupancy buildings (e.g., call centers), and multi-tenant units. More recently, PONs are being deployed in lower port-count environments due to the energy, space and maintenance savings. To showcase this upcoming technology in a standards-based deployment, the Telecommunications Industry Association (TIA) recently implemented a PON at its headquarters in Arlington, Virginia using CommScope's Optical LAN Solution (OLS) and Tellabs Optical LAN equipment.

The Basics

Sometimes referred to as a passive optical LAN, a PON is a point-to-multipoint architecture that employs unpowered optical splitters to enable a single strand of singlemode fiber to serve multiple users (or devices). PONs leverage the distance and bandwidth capabilities of singlemode fiber to deliver converged IP voice, video, data and building automation over the single fiber strand, while enabling efficient management and utilization of bandwidth and offering measurable OpEx and CapEx savings with green benefits.

A PON is comprised of an optical line terminal (OLT) in the data center or main equipment room (ER), optical network terminals (ONTs) at the end user or device locations and a passive cabling infrastructure of singlemode fibers that use splitter technology to "split" the single input path into multiple output paths. At the work area, an ONT terminates the singlemode fiber and converts the signal to one or more twisted-pair copper outputs to interface with Internet protocol (IP) enabled devices, including voice over IP (VoIP) phones, computers, card readers, cameras or wireless access points (WAPs).

Because a PON is passive, no power is required from the data center to the work area, which can translate into an energy savings of up to 50 percent depending on the installation. Passive splitters replace traditional active switches and come in a variety of options, including CommScope's OLS that integrates cross-connect patching and zone-type splitting to free up a significant amount of square footage within a facility. In fact, in a PON deployment, multiple buildings can be served by one main ER. The lightweight, smaller diameter singlemode fiber used to connect the PON components (i.e., OLT to ONT) also uses less cabling material and requires less pathway space and associated pathways materials such as cable tray and penetrations. This combination of energy, space and material savings has led to PONs being recognized as an environmentally-friendly technology.

In addition to reducing the amount of active equipment and associated power and cooling, space and material, PONs offer a fast deployment. It is typically easier to install a single fiber to the work area rather than the traditional process of installing multiple homerun copper cables from the telecommunications room (TR). By using CommScope's plug-and-play OLS components to distribute the singlemode fiber all the way from the Tellabs OLT to the ONTs, the ease of installation was especially realized at TIA headquarters.

"When we first looked at PON, it wasn't about being green—it was more about taking advantage of a new technology and quickly installing a robust, scalable network that offered some key benefits."

– *Herb Congdon, associate vice president of technology and standards development for TIA*

An Advanced, Green Option

TIA, responsible for developing network cabling performance standards, carefully considered its options and strived to deploy an advanced, emerging technology. They also wanted to take advantage of some of the newest technologies that their member companies could offer.

"As a standards organization, we are at the forefront of technology, and we realized the PON was one of the latest technologies to consider," says Tony Zarafshar, IT manager for TIA. "While typically deployed for larger businesses, we decided to go with a PON because it was a new, environmentally-friendly option that we were excited about."

In addition to deploying a PON, the Association wanted to take advantage of a fiber-to-the-desk (FTTD) solution without the need for optical network interface cards (NICs) installed in end devices. Because the singlemode fiber of the PON is converted to copper at the ONT, typical copper-based NICs and other network end devices can easily connect to the network. "We weren't new to this type of technology since we had some FTTD at our old location. But with FTTD, we had to purchase optical NICs for every server and computer," says Bisrat Bainesagn, senior network manager for TIA. "With the PON, we have four copper interfaces at each ONT and can now avoid that expense."

The project also demanded a solution that would allow a fast deployment due to time constraints. By using CommScope's plug-and-play OLS solution, TIA was able to complete the entire installation in less than two weeks. "One of the great benefits with this type of plug-and-play PON solution is that you really don't need expert fiber termination craftsman on site," says Charlie Fox of Vector Resources, the design and installation contractor for the installation. "Everything is simply pulled from component to component and plugged in. Another time saver is the fact that the comprehensive testing required with a typical installation is eliminated. Once the channel is up and running, the ONTs provide an immediate loss calculation on the fiber."

Ultimately, the PON also provided TIA with a sustainable, environmentally-friendly installation. "When we first looked at PON, it wasn't about being green—it was more about taking advantage of a new technology and quickly installing a robust, scalable network that offered some key benefits," says Herb Congdon, associate vice president of technology and standards development for TIA. "In addition to singlemode fiber being the closest thing to a future proof media, PON allowed us to reduce power consumption and raw materials with fewer electronics and just a few passive fiber runs rather than multiple copper runs. "

As part of the installation, TIA plans to acquire certification for the network under the emerging Sustainable Technology Environments Program (STEP) rating system that addresses sustainable planning, design, integration and operation of low-voltage building and communication technologies. In addition to the energy, material and space savings provided by the PON, TIA will also seek to acquire credits for the reuse of existing equipment and applications that reduce paper consumption and waste.

"Throughout the entire planning process, we've taken sustainability into account. We eliminated paper-based documentation, and we will be deploying a variety of applications that further reduce paper consumption and waste, such as video conferencing and remote monitoring capabilities to reduce travel and associated greenhouse emissions," says Congdon.

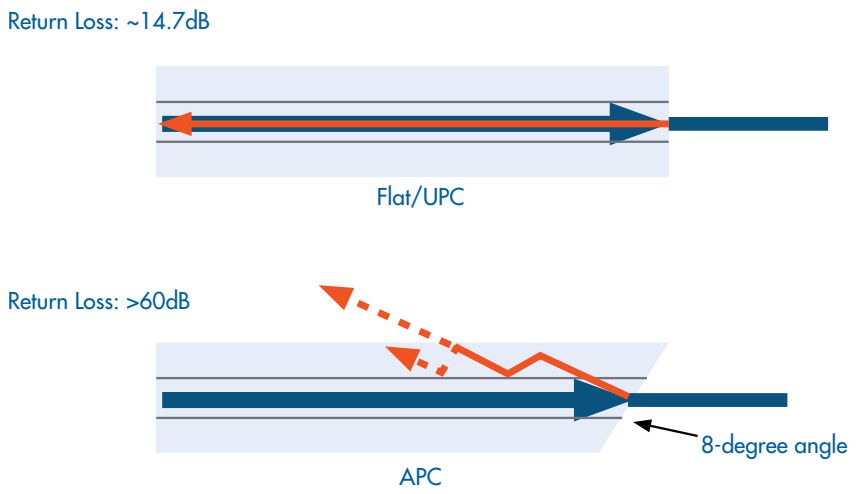
Tellabs 1134 Multiservice Access Platform installed at TIA headquarters

Why Singlemode and APC Connectors?

PONs use wave division multiplexing (WDM) technology, which combines multiple optical signals onto a single fiber strand by using different wavelengths of laser light. This enables bidirectional communications over one strand of optical fiber, using one wavelength for downstream transmission and another for upstream. WDM transmission requires singlemode fiber due to its higher bandwidth capacity. The smaller core of a singlemode fiber allows for the propagation of only one path of light, so distortion from overlapping light pulses is reduced. PON electronics are therefore singlemode fiber-based due to the fiber's higher bandwidth capacity and longer distance capabilities.

While the connection points in a PON can be a subscriber connector-ultra physical contact (SC-UPC) type simplex connector, CommScope's OLS uses angled physical contact (APC) connectors to reduce reflections. When a PON delivers radio frequency (RF) video signals, a third wavelength via WDM is used. This introduces back reflectance at connection points. RF systems are extremely sensitive to any back reflections from connectors—the reflected signal back into the downstream signal causes degradation of that signal.

The physical difference between APC and UPC connectors is the end face geometry. The APC ferrule end face radius is polished at an 8-degree angle, while UPC connectors are polished with no angle. When light is reflected at the flat connector interface of a UPC connector, it is reflected straight back at the source, increasing the return loss value. However, when the same signal passes through the APC connector, the angle causes the reflected light to be reflected into the cladding. The angle of the APC end face reduces back reflection in the 1500-nanometer and above wavelength range for proper transmission of injected RF video stream (analog). Additionally, future PON releases to support 10 Gb/s will utilize a higher wavelength of 1577, which is also subject to back reflections. Planning now for the future with APC connectors will avoid having to update connectors later.



The flat connector interface of a UPC connector reflects light back at the source, while the angle of the APC connector reflects the light into the cladding.

The CommScope Rapid Fiber Distribution Hub (iFDH) installed at TIA headquarters.

The FDT serves as a consolidation point closer to the work areas.

A Plug-and-Play Deployment

To support more than 50 users and a variety of network devices, TIA selected CommScope's 72-port Rapid Fiber Distribution Hub (iFDH) that administers the fiber cable from the Tellabs OLT. The iFDH uses splitters to distribute the fiber out to three Rapid Fiber Distribution Terminals (FDTs) that serve as compact consolidation points, and from there, to the Tellabs ONTs at the workstation.

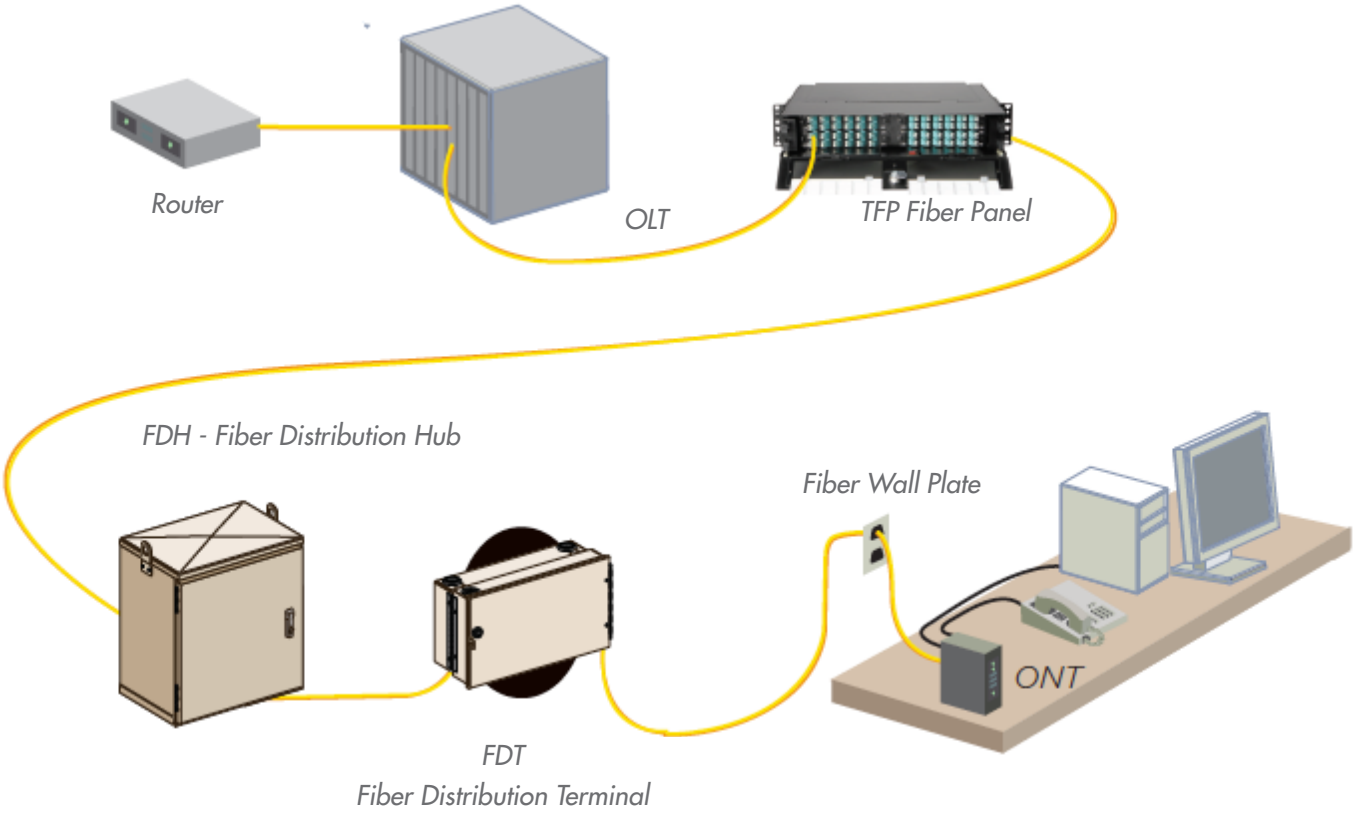
For the OLT located in the main data center, TIA selected Tellabs 1134 Multiservice Access Platform (MSAP). This feature-rich, packet-based and high-bandwidth platform supports incoming voice and broadband services. From the OLT, singlemode fiber pre-terminated to SC angled physical contact (APC) connectors plug into cassettes housed in CommScope's Fiber Panel (TFP) that serves as the interconnection point. The back of each TFP cassette features a 12-fiber MPO adapter for simple plug-in of the pre-terminated 12-fiber RapidReel™ feeder cable from the iFDH. Within the iFDH, the RapidReel feeder cable is stored on a reel and only the distance needed to connect back to the TFP is reeled off while the remaining cable slack is stored within the iFDH. As a result, there is no need to know exact cable lengths beforehand. The RapidReel can hold up to 152 meters (500 feet) of RapidReel feeder cable, allowing the iFDH to be located virtually anywhere within the building.

At the CommScope iFDH, the 12 single fibers of the RapidReel feeder cable support 3 Mini Plug-and-Play Splitter Modules and 9 pass-through fibers. CommScope's splitter modules use advanced planar lightwave circuit (PLC) technology to split each of the three fibers into 32 for a total of 96 fibers. PLC technology offers higher split ratios, more precise splitting of the light and a compact size over traditional splitter technologies. In the iFDH, the 96 fibers cross connect back to 12-fiber MPO connectors for simple plug-in of the pre-terminated RapidReel feeder cables from the FDTs that serve as consolidation points closer to the work area.

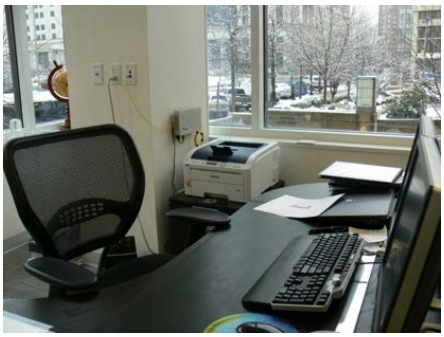
At TIA headquarters, the three FDTs are mounted to cable trays close to the work areas they serve. Like the iFDH, the FDTs also feature built-in RapidReels that hold either 12- or 24-fiber RapidReel feeder cables. These cables are pulled back to the iFDH with the remaining stored at the FDT on the reel. Within each FDT, a localized patching field allows for single fiber cables to be distributed to work area outlets for connecting to the Tellabs ONT.

At each work area, the Tellabs Desktop ONT features four copper interfaces that support 10/100/1000 BASE-T Ethernet for data and VoIP. The ITU-T G.984-compliant 2.5 gigabit per second (Gb/s) downstream and 1.25 Gb/s upstream interfaces can be used for connecting to a variety of devices, including laptops, personal computers, telephones, printers and other peripheral devices. The Tellabs ONTs feature dynamic bandwidth allocation that allows for modification of bandwidth distribution across the four ports. In addition, Tellabs stackable and scalable 24-port 1600-729GP Multi-Desk ONTs were used for connecting to telephones in meeting areas and WAPS throughout the facility.

"One of the nice things about the ONTs we deployed is that they can provide a burst of bandwidth to any of the ports as needed," says Zarafshar. "The Tellabs ONTs also provide us with port-level management and monitoring so we can easily control the bandwidth that each user receives."



TIA headquarters features a PON design using CommScope's OLS which takes up less floor space and requires less cable.



The Tellabs ITU-T G.984-compliant ONTs mounted at each work area support a variety of devices, including printers, telephones and computers feature dynamic bandwidth allocation to provide a burst of bandwidth to any of the four ports as needed.

A Showcase for Technology

In addition to the easy installation that eliminated the need for field termination of the optical fiber, TIA's new PON provides additional benefits associated with fiber, including resistance to electromagnetic and radiofrequency interference (EMI/RFI) and crosstalk, greater tensile strength and virtually unlimited bandwidth.

"While copper technology has done an excellent job of migrating and keeping up with bandwidth demands," says Congdon, "for a person like me who grew up as a 'fiber guy,' there is definitely a certain level of excitement to see a solution that effectively brings optical fiber to the desk."

While other options exist for distributing singlemode fiber from an OLT to ONTs in a PON, TIA's plug-and-play hub-and-terminal infrastructure using CommScope's OLS and Tellabs equipment took up the least amount of floor space, required the least amount of cable, and provided the greatest scalability and flexibility. With fewer electronics and the plug-and-play features of CommScope's advanced OLS, the network will also offer TIA reduced troubleshooting and maintenance costs and reduced power consumption for maximum sustainability over the life of the system.

From the extremely fast network deployment, to the energy, space, and material savings that meet the latest green initiatives, CommScope is extremely proud to provide an industry-leading standards organization like TIA with an advanced passive optical network infrastructure that offers overall reduced lifecycle costs. As a showcase for this advanced technology, the network has been up and running perfectly since the end of 2012 with many compliments from both TIA users and visitors alike.

Joining the ranks of large government and big business facilities taking advantage of the latest in advanced PON technology, TIA now has a truly state-of-the-art network with the flexibility and scalability to support both current and future applications as they continue representing the technology industry through state-of-the-art standards development.

CommScope (NASDAQ: COMM) helps companies around the world design, build and manage their wired and wireless networks. Our network infrastructure solutions help customers increase bandwidth; maximize existing capacity; improve network performance and availability; increase energy efficiency; and simplify technology migration. You will find our solutions in the largest buildings, venues and outdoor spaces; in data centers and buildings of all shapes, sizes and complexity; at wireless cell sites and in cable headends; and in airports, trains, and tunnels. Vital networks around the world run on CommScope solutions.

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