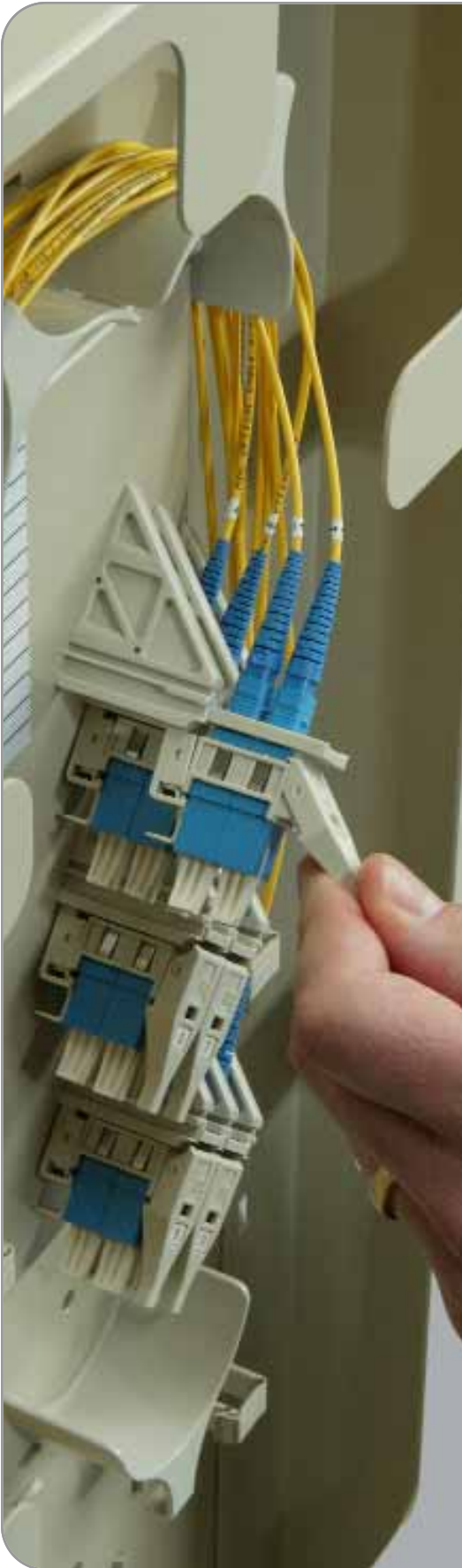


Central Office Readiness Considerations for FTTX Deployment



Central Office Readiness Considerations:

Getting the central office FTTX-ready helps avoid unexpected problems during FTTX deployments

As carriers begin deploying FTTX architectures, they are focusing a lot of attention on the outside plant (OSP) segment. And why not? This architecture presents many challenges with passive optical networking (PON) technology, thousands of distribution lines and connections, power and distance concerns, and so many other issues to address. Basically, the mindset is that if a problem is going to surface during the FTTX deployment, it will likely happen downstream.

But ADC believes there could be complexity lurking where carriers might least expect it — back in the central office (CO) — and is providing services to help identify avoidable issues. It's a fact that the CO, though often overlooked in the planning stages of FTTX migration, has a very distinct impact on the FTTX infrastructure in terms of inventory, cable management, physical space, fiber characterization, power plant, passive and active elements, and other issues that could negatively impact a deployment plan.

With these issues in mind, ADC is aggressively and proactively working to make carriers aware of potential problems within the CO by creating a new service through its professional services group. The company has developed an FTTX service pack that provides solutions for potential problems before they can affect the FTTX deployment.

The program is designed to help operators determine if their CO is FTTX-ready or if it requires any minor or major modifications. Operational issues within the CO may greatly affect the FTTX network as it gears up for services. Identifying and solving these issues early in the planning stages helps guard against major problems occurring within the CO as the network comes on line — problems that could delay turn-up of services and add heavy additional expense to the overall system deployment.



What's really in my CO?

The first issue is for carriers to know exactly what is in the CO in terms of physical assets. Often, inventory records and databases are out of date and contain erroneous information. In other words, large discrepancies often create major differences in what a carrier believes is in the CO according to the records, and what physical assets are actually in place and functioning properly.

For example, ADC worked on the inventory and database for one customer's CO and discovered 235 discrepancies between the asset management system records and the physical inventory actually contained within the CO. For carriers with multiple COs, the potential for operational issues during FTTX rollout could be huge. Therefore, an audit of inventory and database records is a logical first step in making the CO FTTX-ready.

Once the audit is completed, cable mining — pulling out dead circuits and cables to make way for new ones — can begin. This might involve removing old lineups of POTS or copper equipment that's no longer needed. Many dead circuits are simply the result of customer churn. Poor cable management over the years could make cable mining an extensive effort, but once completed, there will likely be more space through the elimination of dead circuits, better efficiency through recabled circuits, and better use of available capacity by incorporating the best practices of cable management.

Poor cable management also makes repairs more difficult since the lines and equipment become more difficult to access. Preventative maintenance also declines for the same reasons. Additionally, as cables begin piling up over time, there's more cable congestion and greater stress on the ironwork, which can create safety hazards.

Actively dealing with both physical inventories and cable mining/management will help create additional needed space within the CO. As the FTTX deployment begins, additional space will be required in the CO for both new equipment and additional cabling. A typical FTTX deployment will have a different overall footprint and different space issues — requiring changes in terms of CO real estate, such as rack and floor space.

For example, a fiber frame installed years ago might be a 12- or 15-inch footprint and hold 700 fibers. Today, a 24-inch footprint holds 1400 to 1700 fibers, creating a higher fiber density with better cable management, but also requiring more physical space in the CO. With the higher capacities made possible by today's high-density fiber frames, every inch of space in the CO becomes a valuable commodity and cannot afford to be wasted or underutilized.

Other considerations concerning space and facilities planning include decisions on whether to remove low-capacity equipment or simply retire it in place. This is a serious issue since overcrowding in the CO makes maintenance and repair much more difficult and costly.

What will work and what won't?

Fiber characterization, or certification, is another area of concern. The fiber asset records could be outdated or the fiber may have been subjected to environmental factors that aren't as common with copper cabling — excessive handling, temperature variations, improper cable management techniques, etc. As network elements were added within the CO, there would likely be additional splices, terminations, and connections in the fiber paths that, in turn, would introduce signal loss, dispersion, or other fiber characteristics.

Therefore, it may be advantageous for the carrier to run a set of fiber characterization tests on as many fibers as possible to ensure each is able to deliver the high bandwidth services required by today's FTTX networks. These tests can also help determine the demarcation point by showing maximum loss or dispersion relative to distance.

The fiber characterization will play a substantial role in the FTTX network design. Depending on the wavelengths required for each fiber, network architects can make informed decisions about which fibers to use for analog television, digital television, and high-speed Internet. A determination must be made about how to best use each fiber and, if the fiber cannot be used, whether to remove it and install new fiber.

Once the operator determines the current fiber capabilities, attention can be focused on power requirements in the CO. As more optical gear is deployed for the FTTX system, more DC power will be required. Ensuring the current primary power systems have the capability to handle these requirements is paramount. If more power is required, consideration must be given to upgrading battery capacity, upgrading the rectifier bays, or adding battery distribution feeder bay (BDFB) panels.

The impact of passive and active elements upgrades should also be a consideration. For example, every additional connector will contribute to the system's loss budget. Therefore, using the patch panels already present in the CO may create problems. The fiber cables and jumpers should also be checked — are they singlemode or multimode? Can they handle the different wavelengths required by the new infrastructure? Will new cables and jumpers be necessary?

On the active side, equipment such as optical-electrical gear may need upgrading, replacement, or additions. Although the gear is generally from other vendors, ADC can help install any additional equipment necessary, regardless of the manufacturer. Other issues to consider would be the requirement by FTTX for higher fiber usage — more wavelengths will be used per fiber. Optical balancing will be necessary on equipment such as add/drop multiplexers and erbium-doped fiber amplifiers (EDFAs). Additionally, much of this work is performed over



the live network and, if improperly executed, could result in service disruption or network downtime.

Finally, it's important to consider issues surrounding asset verification and recovery, provisioning, troubleshooting administration, and the separation of regulated and unregulated assets within a common CO. Engineering and planning are greatly affected by all of these issues. If the operator doesn't know what equipment is functioning in certain parts of the network, putting the rest of the FTTX puzzle together will be very difficult at best.

Advantages of FTTX-ready COs

Undertaking each of these areas within the CO may seem like a costly and time-consuming undertaking at first glance, but ADC makes the services very adaptable for different operator scenarios. The reality of this service is that an ounce of prevention really is worth a pound of cure. If these issues are discovered too late in the deployment, it can be a much more costly and complicated process to correct them. The benefits of an FTTX-ready CO far outweigh the possible consequences.

Actual case studies conducted by ADC have determined the primary benefit of ensuring an FTTX-ready CO is faster and easier deployment of the network. This can be tied to ensuring the marketing goals and deadlines for service turn-up are more easily planned and achieved. Faster and easier deployment equates to meeting the marketing rollout schedule. These services also increase reliability by eliminating dead circuits from the network and virtually cleaning up the entire CO.

In the long term, FTTX deployment costs will actually decrease as a result of achieving a faster time-to-market. Forward deployment costs might also be reduced by addressing problems before they become critical issues that slow down the actual deployment and service turn-up. Service turn-up is not the time an operator wants to

discover there are fiber characterization problems within the CO.

Finally, the service providers must consider the cost benefits of getting the FTTX network up and running as soon as possible. Although these costs may be difficult to quantify at times, they could be significant factors in deciding whether an FTTX-ready CO makes sense.

For example, end users are currently paying \$30 for POTS services in terms of the average revenue per user (ARPU). If most of these same users are willing to pay \$130 per user for triple play services over an FTTX network, the carrier must ask itself one question – how long can I delay getting into this market where the ARPU is significantly higher than what I'm receiving now?

The answer is obvious. Carriers need to ensure their COs are FTTX-ready at the initial stages of deployment. Addressing possible problem scenarios early, while adding additional flexibility and scalability to the future network, will provide a significant competitive edge in terms of time-to-market and ease of deployment.

Getting the right help

ADC offers a complete set of services that will make every CO FTTX-ready. The services are customized to the needs of each service provider according to individual requirements and specific network architectures. With more than 20 years of experience in providing professional services, ADC offers a wide range of necessary skill levels for addressing every aspect of the CO.

The company's national footprint, as well as its ability to work in multivendor, multitechnology, and multiservice environments, provides expertise on projects at every level – from small deployments to large multicity or regional rollouts. ADC's FTTX service pack will allow any carrier to optimize its CO to handle every aspect of a new FTTX architecture well into the future.



Web Site: www.adc.com

From North America, Call Toll Free: 1-800-366-3891 • Outside of North America: +1-952-938-8080
Fax: +1-952-917-3237 • For a listing of ADC's global sales office locations, please refer to our web site.

ADC Telecommunications, Inc., P.O. Box 1101, Minneapolis, Minnesota USA 55440-1101
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