The iODN, a smart fiber manager

With the ODN driving down construction costs and boosting ROI, FTTx is powering along a rapid development path. The iODN is the culmination of the industry’s strong focus on building, operating and maintaining the ODN cost-effectively.

By Li De

ODN management is vital

Statistics reveal that 150 million FTTx subscriber lines were deployed worldwide in 2009. Over the next three years, up to 800 million FTTx subscriber lines are expected to be added, heralding an FTTx boom. In China, the year 2009 saw the deployment of 20 million FTTx ports and 55 million kilometers of fiber core, reflecting a 20% annual growth rate in the fiber area.

To ride the FTTx boom, the access layer must come equipped with a huge optical distribution network (ODN). ODN construction does not come cheap, however, accounting for up to 50-70% of total FTTH investment. Given the ever-increasing bandwidth demand by services, the ODN must be able to sustain long-term broadband network development regardless of the technology and the lifecycle of major equipment.

The ODN also represents the most difficult part of FTTx management, as it is fundamentally more complex than a copper wire network. The latter exists through a simple P2P structure, unlike the ODN’s predominant P2MP topology that requires multiple connecting nodes and a solution for complex network management. In addition, fibers are more vulnerable to operational errors and attacks by rodents.

Efficient ODN construction and O&M necessitate a set of intelligent and accurate management solutions that fully utilize the ODN and effectively protect long-term investment. Consequently, leading operators and standardization organizations such as the ITU-T are beginning to prioritize feasible ODN management.

iODN: an ideal management tool

ODN management is simple and basic in the context of a PON. The inventory management system stores data about copper wires, fibers, pipes, and distribution frames, which is then retrieved during service activation and maintenance. However, this management model creates two major problems.

First, manual data entry is plagued by an average error rate of 20%. During construction, engineers must print engineering drawings and perform tasks by default rules, such as numbering board ports from left to right and manually entering all network information into a database. Human error compromises this process, and database information quickly becomes out of date due to improper management.

Second, manual operations induce inefficient O&M. At the O&M phase, all fibers in a PON are located manually, which lowers network management efficiency and dampens broadband service growth.

So, can ODN management be automated to solve these problems? With Huawei’s intelligent ODN (iODN) solution, the answer is a decisive “yes”. The solution adds a number of intelligent capabilities to the network without changing any passive ODN features. Incorporating a PDA with visualization software to simplify and enhance field operations, the solution provides such intelligent capabilities as fiber connection identification and management, intelligent fiber indicators, intelligent optical splitter management, port searches, and the collation of port status data. The PDA enables the ODN to communicate with the inventory management system in real time through a wireless MAN or a wired broadband network, while the PDA connects with, and can temporarily power, the iODN through a USB port.

Fiber ID management: Embedded with an eID, the fiber connector reads the eID data of plug-in fibers to realize intelligent fiber management. Similar to an MAC address, the eID provides a globally unique identifier that stores data of a given fiber, including its route, position in the optical cable sequence, and connected optical splitter or distribution module. By managing the eID, the solution controls fiber links across the ODN by such means as automatically generating a topology and checking the fiber connections.

Port status collection: An iODN device can automatically collect and report the resource status by reading and then downloading the fiber connection status of all ports to the PDA through a USB port.

Port search indication: Activated by the management module, each port in an iODN device uses an LED indicator to display the fiber port that requires maintenance. This raises the precision and ease of onsite maintenance via a visual interface.

Visualized PDA: The PDA provides three functions. First, it supplies temporary power via a USB port connection and activates the management module of the iODN. Second, it serves
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as a communication bridge between the iODN and the inventory management system to enable data exchange. Third, as the major construction and maintenance interface, it facilitates dispatch list management, operational instructions, and information inquiries. Each function is accompanied by a graphical interface, which greatly improves O&M efficiency, ease and accuracy for engineers.

Unprecedented ease of use

Intelligent and automated, the Huawei iODN solution represents the optimum method for easing the challenges of construction and O&M, reducing costs, and maximizing efficiency.

The solution allows engineers to freely download electronic drawings on a PDA through wireless or fixed networks, rather than completing them during construction. The PDA and the iODN connect via a USB connector, so engineers are no longer required to memorize a series of default rules. Construction tasks can be accurately and efficiently completed by following the LED indicators and the PDA. Instead of completing a confirmation form on project completion, engineers can use the PDA to collate connections and port status data, which the PDA then uploads to the inventory management system.

When the PDA has obtained electronic dispatch lists during routine maintenance, engineers can simply insert the PDA into the iODN, and the LED indicator and the PDA display will immediately indicate if a port requires maintenance, helping them perform O&M tasks accurately. The PDA also automatically records changes to the data about fiber links, ports and others and reports them to the inventory management system to synchronize system data.

Thus, the iODN solution automatically records and manages ODN fiber connection information to maintain the accuracy and timeliness of the inventory management system and eliminate human error. In addition, the visualization software on the PDA and the smart LED indications on the iODN combine to support automatic fiber search and accurate operations, significantly improving O&M efficiency.

Based on the iODN structure, the inventory management system supports a variety of value-added applications for automated construction and O&M. For instance, the system can automatically generate the tools and materials required for a dispatch list and create an online material request workflow. With its built-in GPS, the iODN and PDA can automatically navigate engineers to ODN sites without the need for information analysis.

As a smart fiber network manager, the iODN solution infuses the end-to-end ODN construction and maintenance process with cutting-edge electronics, intelligence, and automation capabilities that vastly improve O&M efficiency and protect ODN investment. H

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