China Chooses Connectorization

CASE STUDY

Despite Low Labor Costs, China Standardizes on a "Plug & Play" Connector Architecture

As the global demand for broadband access continues to rise, service providers around the world are accelerating their deployment of fiber networks, from fiber-to-the-node all the way to fiber-to-the-home (FTTH) installations. China is at the forefront of the FTTH deployment scene. With more than 1.3 billion people, it has the largest population in the world and thus represents enormous potential for fiber deployments. In fact, China now ranks 16th among the 20 world economies with the highest market penetrations of FTTH.

Chinese subscribers' appetite for bandwidth is just as voracious as that of people in other nations. A January 2009 report by Research and Markets stated that as of mid-2008, about 253 million Chinese "were actively involved in online communities. Of these, 214 million use broadband to access the Internet." According to the report, FTTx is "the most promising technology for providing the needed bandwidth" The report concluded the number of customers with fiber connections "is certain to grow," particularly because xDSL simply cannot satisfy the ever-increasing demand for more bandwidth.

ADC®

What is the Most Cost-Effective Connection Strategy?

Like our counterparts around the world, Chinese service providers want to install flexible and reliable FTTH architectures at the lowest possible cost, and they must make several important decisions, said John Yang, ADC's FTTH Product Manager in China. "Among those decisions is how to connect the various fiber segments--feeder, distribution and drop--which carry the signal from the central office to the subscriber premises."

The choice is to use splicing or a connectorized (plug-and-play) approach for the optical splitters in distribution frames, fiber distribution hubs (FDHs) and distribution boxes. For many service providers, it has been easier, at least initially, to build a business case for splicing. Although that approach is more labor-intensive than the use of connectorized terminations, labor rates in many nations, including China, are extremely low relative to other countries.

Further bolstering the early arguments for splicing was the fact that network architects who designed some of the early FTTH deployments discovered that connectors experienced more loss than occurred with straight splicing. To minimize their loss budgets, they decided that splicing inputs to the splitters was preferable.

Unfortunately, splicing fiber to the splitters has created its own set of problems, starting with the amount of time required to install each splitter. In addition to taking considerably longer than mating two connectors, splicing affects the work force: the addition of each new splitter requires the dispatch of trained, highly-skilled technicians who need specialized splicing equipment. If one or the other is not readily available, the time required to perform the task increases and thus slows down the overall deployment.

The initial turn-up of the cabinet gives rise to another splicing-related problem. To test all the fibers, a technician must splice pigtails to connect each input to the test equipment. Splicing on pigtails and cutting them off again after testing consumes a great deal of time during initial turn-up, which could prompt some technicians to test the fibers through the splitter or to not test them at all. Both practices can reduce the network's performance and reliability. In addition, because testing the splitter requires a technician to splice a connector to the splitter's input, testing both the fiber and the splitter requires a technician to break a splice; splice connectors to both the fiber and the splitter; run the tests; cut off the connectors; and re-splice the fiber to the splitter input. Clearly, this multi-step process costs a great deal of time and money.

Although money is obviously a major concern for cost-conscious service providers, time to market is a big factor, too. Subscribers in China, like subscribers in most areas of the world, are pushing for high-speed access and the additional bandwidth they need to support their applications.

China Opts for Connectorization

China Unicom Group Corp. (formerly China Netcom Group, CNC), along with other Chinese service providers and vendors, worked with various local forums to determine the appropriate connection strategy. In early 2008, China's Minister of Information Industry (MII) released the China FTTH National Standard, which advocates a connectorized approach throughout the network, including feeder cables. The standard is retroactive to October 2007.

In a recent interview, Mr. Zhong Deqiang, former Director of Chief engineer's office CNC Beijng Branch/ Chief project leader on FTTH field trials, noted that his company was among those urging MII to adopt the connectorization standard. After two years of field trials, plus observations of service providers' experiences in other nations, Zhong said he and his CNC colleagues concluded the connectorization approach is "much more suitable for the Chinese market." Acknowledging the upfront costs of connectorization may be higher than those associated with splicing, he said there is "not much difference" in final costs between the two approaches when a service provider also takes into account the costs of troubleshooting, maintenance and future network upgrades. Connectorization offers great, long-term benefits for life-time maintenance work and significant OPEX cost savings.

China Opts for Connectorization

- Delivers lowest cost of network ownership = CAPEX + OPEX
- Allows for flexibility to meet future network requirements – Electronics/Technology upgrades
- Delivers faster return on capital
  - Connectorized architectures allow faster network construction, positively impacting internal return on capital metrics.
- Enables carriers to avoid unnecessary capital costs
  - New FTTP markets may not have to purchase capital equipment (splice machines) to deploy.
- Aligns expenses to revenue
  - Drop placement can be deferred until customer turn up.

In fact, more and more service providers in other nations also are opting for a connectorization solution. As FTTH equipment volumes increases, vendors such as ADC have significantly improved connector quality, reducing the loss attributed to a connection to about one-tenth of a dB. In addition, splitters themselves have improved by 0.5 to 1.0 dB in loss budget calculations, and the numbers will continue to get better.

Connectorization Delivers Specific Benefits

With the improvements in the loss characteristics of both fiber-optic connectors and optical splitters, the operational cost advantages of connectorization far outweigh the initial cost savings of splicing. These advantages include faster installation and service turn-up, easier test access, lower training requirements, less specialized equipment and, overall, a more flexible network.

Adding a connector to the fiber saves technicians a great deal of time, allowing them to test the inputs and install the splitters more quickly than they can by using splices. For example, a technician can install an ADC splitter in less than five minutes. In addition to dramatically reducing the time and expense of installing each splitter, the connectorization approach provides one more area for segmenting the network during troubleshooting procedures.

- *Central office* - a key plug-and-play feature within the CO is the multi-fiber push-on (MPO) connector. An industry standard, the MPO connector enables one connection to terminate multiple fibers, as opposed to individual SC connectors for each individual fiber.

- *Outside Plant* - In the outside plant, a connectorization strategy reduces initial construction costs, as well as those associated with turning up new customers. The original distribution method in the FTTH serving area involved splicing drop cables at drop points, during construction. Now hardened connectors and adapters not only save money in terms of labor costs but also speed up installation of the distribution plant, delivering even greater savings when deploying FTTH services. ADC terminals are factory pre-terminated with 15 to 607 Meters of outside plant cable in configurations of 2-, 4-, 6-, 8-, or 12- fibers. Technicians return each terminal tail to a centralized splicing point, where splicing crews can perform the same number of splices in a far shorter time period.

- *Multiple-Dwelling Units (MDUs)* - As in the other portions of the FTTH network, the significant advantage to a connectorized approach is fast installation times. That advantage is particularly evident in bringing fiber into new MDUs, a building type that is prevalent in such nations as China, Japan and the United States.

An indoor FDH is located on the lower level with, for example, two 144-fiber stubs. With the splicing approach, fiber distribution terminals (FDTs), residing on each floor of the building, route 12 or 24 fibers down to the indoor FDH where technicians typically splice them in. Technicians must splice 288 fibers between the FDH and the FDTs and then run drop cables from the FDTs to the optical network terminals ONTs--which creates yet another splice, point because it is impossible to predict the exact length of each drop. By contrast, the connectorization approach has an MPO connector mounted on the stub of each FDT, and the fiber runs from each FDT to the indoor FDH, which features built-in 12-fiber MPO connectors. Technicians can easily plug each connection into the FDH from every floor, which means that installing fiber in an MDU is a simple matter of mounting the enclosures and making plug-and-play connections with the cables. ADC also has designed on the FDT a built-in fiber spool which holds up to 152 meters of fiber cable. Technicians can easily spool cable out to the FDH and plug it in, while any extra cable remains on the spool.

A connectorization strategy enables FTTH service providers to save significant time and money that would otherwise occur with a splicing approach. Those savings are especially evident in the MDU environment, where splicing 12 fibers typically takes one hour. That's not even taking into consideration the capital equipment costs involved with splicing, such as purchasing splice machines, cleaving machines and stripping equipment.

The goal of any service provider deploying an FTTH network is to balance initial equipment costs with the operational costs involved in long-term performance of the network. China's MII, along with service providers around the world, recognize that a connectorized approach throughout the FTTH architecture makes it possible to deploy the network quickly and reliably, provide bandwidth very cost-effectively and deliver a faster return on investment.

"As one of the world leaders in FTTH infrastructure solutions, ADC is excited to share our global expertise and local manufacturing capabilities with our customers in China. It's our goal to help carriers develop cost saving, price competitive and future-proof FTTH infrastructure," said Yang. "China carriers are well aware that a successful fiber network needs to well-designed at every access point, from the CO to the Premises. This is where ADC excels, helping carriers build future-proof fiber infrastructure to make their network plans a reality."

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