What Factory Cable Testing Cannot Tell an Installer

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As the use of pre-terminated fiber becomes essential for high performance networks and new topologies in the datacenter, keeping the basic fiber fundamentals in mind will alleviate business, technology and performance issues.

Introduction

Related to field terminated fiber cabling, factory terminated and tested fiber has better optical performance and fewer installation costs. The precision and consistency of factory terminated fiber cabling greatly improves the loss and reflection attributes of the connectors. Once delivered to the end-user, though, the installation process exposes the cable to stress and potential damage that is beyond the scope of any factory test. If installers and network owners take a few simple steps, they can avoid performance problems and ensure that the manufacturer's warranties are upheld.

Problem and Solution

Pre-terminated fiber is a true accelerator for datacenter fiber networking. Compared to conventional fiber it is faster to install, faster to change and when coupled with OM3/OM4 fiber it can support faster data rates. Combined with a variety of connector options, pre-terminated fiber assemblies are an attractive solution for enterprise storage area network (SAN) and datacenter networks.

Most manufacturers perform a regimen of tests on pre-terminated fiber cable assemblies before shipment. These tests are meant to ensure the performance of cable/connector assemblies. When applied properly, factory testing provides customers some peace of mind that the products met their loss-limit specifications and all fibers in a multifiber array were functional when the product left the shipping dock.

There is a gap, however, between a cable exiting a factory and a cable reliably delivering bits to a destination switch port. Professional cable installers and enterprise network technicians have learned through experience that real-world factors will intercede to turn a cable assembly that "Worked when we shipped it to you" into a weak link in the transmission chain. Knowing this and recognizing the exposure should give you pause

before taking a warranty for granted. Moreover, understanding how to mitigate the inherent risks helps you avoid unnecessary network downtime and/or expensive callbacks and slower network performance.

The first real world factor to consider in installing preterminated fiber is that the installation process introduces a risk to the cable and its connectors. More specifically, pulling cable through a rack or down a tray can break a fiber in the cable. Yes, it is true that fiber is designed to be pulled. It is also true that fiber gripping tools reduce the stress-points on cable when it is being pulled. Nonetheless, when the maximum pulling force on a fiber can be as little as 100 pounds it is quite possible for an average installer to exceed that maximum and shear one or more fibers in a preterminated trunk. This most often occurs when fiber is pulled around a corner or around an obstacle. If this occurs, a factory tested preterminated fiber will fail to function per specifications after installation and the manufacturer's warranty may be rendered worthless.

In fact, a manufacturer's warranty can create a false sense of security if an installer or network owner assumes that a pre-terminated cable will meet specification after installation simply because the manufacturer offers a warranty. Be sure to read the fine print - it may stipulate that documentation proof of a post-installation loss test is mandatory to create a valid warranty.

The second real world factor about installing pre-terminated fiber is that the installation process creates a risk to the cable through microbending and macrobending. While this is not an immediate catastrophic failure, excessive bending introduces loss that impedes performance. Although vendors have introduced cable with greater "bendability," they too have minimum bend radii.

Loss events caused by over-bending fiber can be more difficult to find than breaks, especially in a multifiber trunk. An array of diagnostic tools can be used to verify to existence of a problem and then locate it if a problem is found.

The third real world factor to consider relative to pre-terminated fiber is the high likelihood of connector contamination or damage. It is very common for the fiber end-faces to become contaminated in the course of

installation. If nothing else, the dust caps may transfer contamination to the fiber. Less commonly, though very dependent upon the installer's carefulness, scratching the end-face by dropping it, laying on a surface, cleaning with a dirty cloth, or a number of other actions during a typical installation.

Summary

The best practices for conventional fiber still pertain to preterminated fiber:

(1) always clean the connectors

(2) test fibers for correct polarity

(3) test fibers for loss against your loss budget

(4) test fiber links sequentially as you install them

(5) inspect and clean all fibers

If you take these steps, you will at a minimum validate the factory warranty and take a giant step towards assuring the integrity of your new pre-terminated fiber infrastructure.

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