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White paper

Retrofitting your raceways

for additional optical fiber

Introduction

The amount of fiber used in today's central office facilities challenges service providers with fiber management issues. In many cases, raceways were installed to accommodate the immediate needs without a plan for future growth. These undersized raceways are now unable to adequately support the enormous amounts of fiber required for today's telecom network systems.

A typical switch room today consists of 12-inch raceways in the main aisles with six-inch raceways used for intermediate line-ups. As more fiber is added, pile-ups occur – sometimes as deep as four inches or more. The Telcordia standard (GR-449) states the cable buildup of fiber jumpers should never exceed two inches in depth at any point within the fiber protection system.

This paper will address the issues regarding fiber build-up in raceways and provide retrofitting solutions that can alleviate potential problems resulting from too much fiber in too little space.

Motivation to retrofit

The fiber running directly over the fiber distribution frames is typically where raceway retrofitting is most necessary. As fiber counts increase, more patch cords are running across these raceways, increasing the need for a higher capacity infrastructure. For example, a five-frame lineup might require 1,000 patch cords per frame, so capacity would be needed to accommodate 5,000 patch cords overhead. This may seem like simple math, but the simple truth is that either service providers don't believe they will ever need five full frames of fiber, or they somehow misjudge the size of the raceway for accommodating growth in the fiber.

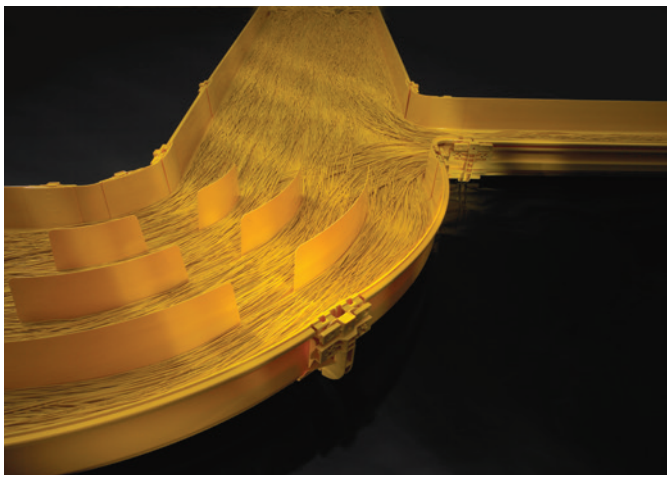
Service providers often base raceway size on their "day one" requirement of one frame, hoping they will have enough space for growth in the raceway and save on initial costs. In reality, not planning for longterm growth becomes more expensive when the need arises for retrofitting raceways down the road. This is where many service providers are finding themselves today – with a need to retrofit their fiber raceways.

Here are some systems and techniques for performing the retrofit without taking fibers out of service.

Retrofit techniques

There are several different methods used to retrofit a raceway system to accommodate more fiber. One method is to use four-inch by eight-inch fiber paper to wrap the fibers together, and then pull them up from the existing raceway with regular lacing cord. (see figure 1) This holds them above the raceways with as little stress as possible to the fibers as the raceway is replaced underneath. This method should typically be used where fibers are not exceeding the limits of the existing raceway by much and are easily bundled together.

In cases where there is an inch or more of excess fiber piled in the raceway, another method may be more practical. With the slide-in, slide-out method, 24-inch raceway is installed beneath the existing 6-inch or 12-inch existing duct. Once in place, the brackets are removed from the smaller duct and it is slid out from under the



fiber, which comes to rest in the new, larger raceway. This puts the least amount of stress on the fiber. Cut-in bracket fittings and expandable straight sections enable easier raceway reconfiguration during the retrofit.

Both methods enable the retrofit to occur without service outages. That said, anytime fiber is handled, there will always be a risk of damage and circuit outage. Finding the smoothest and most effective means of retrofitting is critical. The retrofit can also be accomplished during maintenance windows and during slower hours.

Having fiber back-up kits available in case of a fiber cut is critical. These kits generally include connectors and fiber to enable rapid repairs, should a fiber be damaged. Prior to starting the retrofit, it is recommended that service providers work with their vendor to verify the longest fiber footage and order the appropriate back-up kit. This should be a primary consideration when service providers evaluate vendors to perform the retrofit procedure.

It's also worth mentioning that service providers should insist on quality technicians to perform any raceway retrofit operation. Typically, this is a task for experienced level 3 and level 4 technicians. From the operational standpoint, the retrofit team should be of the highest technical caliber possible.

Plan, plan, plan

Planning is the key when it comes to initial installation of fiber raceways. It's important to not only consider having the right capacity well into the future, but also from the standpoint of routing within the raceway. There should be diverse pathways to minimize choke points or pile-up points that prevent all the fibers going through the exact same piece of duct or raceway. For instance, a fiber frame line-up is more efficient when fed fiber from both ends of the line-up as opposed to all the fiber coming from just one end.

Not all retrofits will expand to 24-inch raceway. It could be an expansion from four-inch to 12-inch duct or four-inch to six-inch. But planning the raceway with future growth potential in mind can save time and expense as the network evolves. Service providers should make certain they plan for the future in terms of how many fibers may eventually run over the top of the distribution frames – carefully considering long-term capacity requirements.

The demand for fiber circuits is steadily increasing as bandwidth capacity usage grows in homes and businesses. A recent example illustrates this point. One recent raceway retrofit project had the dynamic growth to fill a 12-inch duct more than four inches deep in fiber – in less than a six-month period. With this phenomenal growth, more service providers should be aware of how much fiber (remember, a maximum two-inch depth is recommended by Telcordia) is currently in their raceways, and how much more may be required in the coming months and years.

Assessing your current fiber counts and planning for future fiber growth is the first step in creating your future-proofed network infrastructure.

Figure 1: Fiber paper retrofit technique shown

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