

Fiber: Your Questions Answered

Do you want to know how far you can suspend fiber? Or how tight you can bend it? Or what role it plays in the wireless world? CommScope's Mike Cooper has the answers to these questions and more.

By Mike Cooper / *CommScope*

In my 25 years in the telecommunications industry, I've gotten a fair number of questions about fiber. Many of these questions are the same no matter where in the world I am. I've rounded up a few of the most-asked here. What are your questions?

1. Will fiber be the best solution to connect cellular network radios in the future?

The consensus is that mobile network operators will opt for fiber as the preferred technology for backhaul and fronthaul to cellular network radios wherever possible because of ever-increasing bandwidth requirements today and into the future.

The density of radios for future cellular networks will drive the requirement for network convergence between wired and wireless traffic and increase the need for fiber network solutions that provide the density, accessibility and flexibility to support multiple applications needed for the future.

Another major goal is to reduce power usage and optimize space utilization

at towers. Many operators are now transitioning to C-RAN (centralized RAN) architecture – and fiber is key to the transition. In a C-RAN configuration, baseband units (BBUs) are moved away from the bottom of each tower and into central offices or BBU pooling locations, which can be located many miles away.

At the central office, the BBUs from multiple cell sites are pooled and connected to the remote radio head via fronthaul connectivity (to carry data from the cell sites to the BBU pool) and backhaul (to carry data from the BBUs back to the core network).

C-RAN offers an effective way to increase the capacity, reliability and flexibility of the network while lowering operational costs. It is also a necessary step along the path to cloud-RAN, in which the BBU functionality will become virtualized. Cloud-RAN will allow for great elasticity and scalability for future network requirements.

2. Over how long a span can I suspend self-supporting fiber?

Most self-supporting fiber optic cables can mechanically withstand the loads of longer distances than are typically specified for each cable. However, the span lengths are often limited by the strain placed on the fiber optic glass inside the cable and/or by the minimum clearance requirements that the National Electric Safety Code (NESC) provides.

Within each NESC loading category (heavy, medium and light), CommScope

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provides span lengths in three categories: NESC vehicular access, NESC pedestrian access and infinity. When a self-supporting fiber cable is latched to a support strand, such as a ¼-inch 6.6M EHS strand, the self-support span limitations no longer apply, as the load is placed on the strand and not on the cable.

However, the only sure way to know the limitations for any particular cable is to review the specifications for the cable.

3. **Can I bend fiber around a sharp corner?**

In the past, where and how to place slack storage was limited. Spools had to be placed up in the overhead tray to keep a large bend radius. Sometimes technicians ran patches through multiple frames to keep the bends out and take up all the slack needed. Now that reduced-bend-radius (RBR) fiber is rated to particular standards, there are panels, frames and wall boxes available that allow technicians to spool the slack right in the unit.

But does this mean technicians no longer worry about how to handle slack coils? Does bend-induced loss go away? Does anyone even bother testing for it? Well, it's not quite that simple. There are still fiber optic glass bend radius standards. ITU-T G.657.A1 has a minimum bend radius of 10 mm, G.657.A2/B2 has a 7.5 mm minimum and G.657.B3 allows bend radii down to 5 mm. With specified bend radii, technicians need to maintain clean systems with the proper RBR. There may still be bend loss, but it might not come from the same causes as in the past. Historically, a technician would trace the fiber to physically see the bend. With today's fiber, bend loss would more likely indicate an improper seating of a connector or a routing issue in a splice tray.

RBR fiber is a great step in fiber technology that will expand to all parts of a network – even the outside plant. Keep in mind that with proper use and cable management, technicians should be able to eliminate bend loss throughout the entire network.

4. **I have heard about eight-fiber connectivity, but I use 12-fiber MPO (multifiber push-on) connectors. Do I need to switch?**

There is a saying that “less is more,” but in this case, the opposite is true. The short answer is “no.” You do not need to switch. If managed well, a 12-fiber MPO infrastructure with more fibers per connector provides 50 percent more usable fibers per connector in the same footprint. This is valuable because evolving standards continue to use duplex fibers (with two strands of glass connecting each pair of end points) as connectivity options through at least 100 Gbps.

The main reason for the introduction of eight-fiber MPO connectors was to provide application support for parallel signals using eight of the available 12 fiber positions of the industry standard 12-fiber MPO connector. This application typically occurs in a quad small form-factor pluggable transceiver. Examples of this transceiver would be the 40GBase-SR4 or 100GBase-SR4, in which four pairs of fiber deliver 10 Gbps or 25 Gbps each to achieve a channel of 40 Gbps or 100 Gbps.

Does bend-induced loss just go away? Well, it's not quite that simple.

Other multifiber connector options, such as the 12-fiber MPO and the 24-fiber MPO, continue to gain popularity in the market. Both are industry standard. The higher-fiber-count MPOs provide much more architectural flexibility and trunk efficiency compared with the eight-fiber application.

5. **How does one confirm compliance of fiber optic cables with new European CPR regulations for in-building applications?**

Introduced in 1989 by European regulators, the Construction Product Directive (CPD), later the Construction Product Regulation (CPR), was designed to ensure that materials and equipment in buildings such as offices, schools and shops are safe from fire hazards and other risks.

A further classification was published in 2016, specifying how products such as communications cables react to fire, and a deadline for the mandatory CE marking of cables was set for July 1, 2017. The European Commission mandates that construction materials such as fiber optics use a common technical language, such as CPR 305/2011.

All manufacturing facilities that serve the European market will need to have been audited and approved by notified bodies, and the building industry will be required to work only with vendors that have carried out extensive testing with these notified bodies and can provide the proper declarations of performance for their cabling products, organized in Euroclasses A to F.

Every product will be required to carry the CE label appropriate to the applicable Euroclassification. The type of testing is determined by the type of verification system used by the notified body. Euroclasses Cca and B2ca use the most stringent verification, System 1+, which requires continuous audits of the production facility and product testing. System 3 includes Euroclasses Dca and Eca, which are lower safety classes.

Approximately 80 percent of the notified bodies are accredited for System 1+ and can assign Euroclass Cca and above. It's important for organizations to ensure they are using the appropriate notified body, which can be found on the NANDO website of the European Commission. ❖

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