

## Tech Tip

# Introduction to Deep Fiber Node +0

Deep Fiber (aka Node +0) is the trend in which MSOs push fiber closer to customers to provide them with better service. As a result, field technicians in the cable industry who are experts at testing copper are now being tasked with installing and testing fiber as it reaches farther into the network. However, handling fiber requires different processes and equipment to ensure it is installed correctly the first time.

In response to this problem, we have created a series of tech tips to get you up and running with everything you need to know. This first tip will cover the basics about fiber, and future tips will cover the technologies you will encounter and the tests that must be performed for proper installations.

Before we get started, we need to define what Deep Fiber Node +0 means. It sounds complicated, but it simply means that fiber is being deployed into more areas of the cable network. Node +0 means that there is no longer a need for an amplifier between the node and the subscriber. This makes for a simpler, less expensive and more reliable network architecture.

- 1) Understanding Fiber** – Fiber is fragile, unlike copper that can be bent sharply and pulled with high strength. Fiber is made up of small strands of glass, so bending it excessively can cause degradation in service quality to the subscriber. Worst case, you break the fiber and service goes down. Fiber is much more expensive to replace, so take great care in handling each fiber cable. Multiple sections of fiber must also be connected via fusion splicing or mechanical connections to complete the route. Optical Time Domain Reflectometer (OTDR) testing is the only way to characterize all properties of the fiber installation.

**2) Connector Types and Inspection** – The cable industry has used SC connectors for decades due to their robustness and standardized on APC polish to reduce reflectance back to the transmitter. As the number of optical connections has increased and space has become a premium, LC connectors have been introduced. The LC connectors are half of the size and therefore the density can be doubled providing the ability to handle more traffic. LC connectors however feature a smaller ferrule (1.25mm vs. 2.5mm) making them more delicate to handle.

Regardless of the type, it is critical that you inspect BOTH connector end faces to make sure they are clean BEFORE making the connection. If either is dirty, use a fiber cleaning tool to clean the end face. Re-inspect the connector(s). When both connectors are clean, make the connection. A fiber inspection probe with integrated IEC61300-3-35 PASS/FAIL judgement is required to ensure connector quality and cleanliness.

**3) Technologies and Service Traffic** – There are three main technologies you will come across in the field. Coarse Wave Division Multiplexing (CWDM), which provides up to 18 channels in a single fiber to allow for more traffic. Dense Wave Division Multiplexing (DWDM), which provides up to 96 channels per fiber depending on the spacing used. And Passive Optical Network (PON), which creates a point to multi-point architecture using passive splitters to serve more subscribers. PON is great for residential applications to cost-effectively reach more homes. As mentioned above, we will look at each of these technologies and the tools required in future tech tips.

One of the biggest differences between copper and fiber deployment in legacy HFC networks is that copper was primarily used in the last mile access portion of the network and a copper coax line would only serve a small number of customers. In this scenario, you could easily take down the line to test because there were only a minimum number of subscribers affected.

With Deep Fiber, the optical fibers continue all the way back to the headend, hub or mother node and a single fiber can supply services to hundreds of customers. Disconnecting the line or inserting a test signal can disrupt services to entire neighborhoods or buildings. This means that you must test the fiber with live traffic and do so without affecting the other subscribers. For example, an out-of-band 1650nm OTDR with filters is required to test point-to-multipoint PON systems. These new testers can test with live traffic, so it won't be as difficult to do as it sounds.

Can't wait for the next tech tip? Learn more about fiber testing here: [Fiber to the Home](#)

### **Products You'll Use for Testing:**

[FiberChek Probe Microscope](#)

[FiberChek Sidewinder](#)

[T-BERD 2000](#)

[T-BERD 4000v2](#)

[OTDR 4100 Series Modules](#)

[DWDM OTDR Module](#)

[CWDM OTDR Module](#)

[OCC-55/56 Optical Channel Checker](#)