



Passive Optics for the MSO: Coherent Solutions for Reliable Service

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The Clearfield PON Pedestal product was originally designed for housing splitters and termination ports for smaller pockets (96 or less) of FTTH PON customers, but our customers have found other, innovative ways in which to use the PON Pedestal. One such customer found it is ideal for housing terminated WDM modules and splitters in the OSP. More recently, this customer has been using the solution for fiber termination and to house a diverse collection of terminated optical components in the OSP. The intent of this white paper is to provide other MSO Fiber Engineers information on the PON Pedestal solution that will reduce headaches and installation times for them going forward.

FIBER EXHAUST: One of the ever-present situations facing MSO's is fiber exhaust, which is driving Cable TV providers to provision their fiber systems with an ever growing variety of topologies (EPON, GPON, RFOG or WDM). There are now new products and solutions to address, simplify and streamline the problem of fiber exhaust. The prevailing method for deploying optical components in the OSP is to use a standard open architecture pedestal or splice case and hard splicing splitters and CWDM's in trays. Over that last couple of years, MSO's have begun to install connectors in the OSP. Previously, there has been resistance to connectorization in the OSP due to concerns of high failure rates and contamination issues. FTTH has put many of those concerns to bed since millions of connectors have been deployed in cabinets, ONTS and cross connect cabinets. Due to the complexity and diversity of the optical components being deployed in Hub Collapse, C/DWDM and RFOG applications, MSO's are rethinking their stance on "splice everything".

Several types of passive devices are being deployed by MSO's. Let us examine a couple of them and how they are used. Keep in mind that in many cases the components for these applications may need to be integrated into one common collection/distribution point. Keeping them organized and manageable is key to providing reliable service.

WDM : MSO's are looking to maximize the bandwidth capability of each fiber in their networks. Instead of consuming two fibers for each business class customer or node (one for TX and one for RX) they are using passive MUX and DEMUX components to combine and separate many different wavelengths of light onto common fibers. Typically the wavelengths are combined in the head end using a passive MUX and then separated out in the field with a DEMUX as needed. Individual wavelengths can be dropped as desired or be broken out - all at a single location depending on the application. In either case, the DEMUX device(s) will need to be terminated or spliced onto drop fibers and sent in different directions. Whether they are using the WDM's for Business Class or Node Segmentation, a robust, user friendly WDM passive deployment platform is desirable. The PON Pedestal can be used as a location for terminated DEMUX components mentioned earlier.

PON : Whether it is GPON, EPON or RFOG, many MSO's are using the advantages of PON to service many business class customers over a single fiber. By using a single feeder fiber and an optical splitter in the field, they are able to effectively use their fiber plant as an alternative to a WDM network. An important part of any PON network is the placement and installation of the optical splitters. The PON Pedestal is designed to house pre-terminated optical splitters that can be routed to any of the distribution ports inside the pedestal.

Hub Collapse: As MSO's push for "Greener" solutions they are closing down (collapse) physical hub buildings and replacing them with smaller, node-size electronics cases. This reduces the power consumption in the network since this new hub-collapse electronics case does not require HVAC, maintenance and other costs associated with maintaining a physical structure. One limitation of this new hub collapse strategy is the loss of a fiber management/termination system. In a traditional hub building layout, a relay rack or frame was used for OSP fiber termination, jumper management and location for terminated optical component (splitters & WDM's). The PON pedestal provides an excellent location for this equipment. The PON pedestal can be installed next to the hub collapse electronics housing and be used as a termination location for the incoming fibers from the electronics as well as fibers that will be run to the nodes. It also provides a "chassis" for mounting optical components. By using jumpers the user can connect optical component ports to the appropriate termination ports.

As we mentioned earlier, the "splice everything in a splice tray or case" method has many potential shortcomings. Issues with this solution include:

- Trays become congested and hard to manage over time
- Difficult to standardize on a method for routing all the fibers in the tray
- With multiple techs servicing the pedestals errors could occur in fiber identification
- Difficult to replace damaged optical components
- Testing required breaking fibers in some cases
- A Fiber Splicing Tech was needed for moves, adds and changes
- As multiple services are provided out of a common location problems compound (splitters, CWDM's, DWDM's can potentially be in the same pedestal or case).

As an alternative, the PON Pedestal (shown below) provides many needed features:

- Fiber Splicing/Termination Platform for OSP Fibers
- Cross connect/Test point for "Home Run" HFC Node Fibers
- Jumper and Pigtail Fiber Slack Management System
- Location for plug and play WDM's and PON splitters. Custom WDM's can be ordered and provided with adapter port for "plug and play" capability. PON splitters are provided with pre-terminated input and output legs for easy routing and installation.

PON SPLITTER
WITH
TERMINATED
LEGS



TERMINATED
WDM
COMPONENTS
LOADED INTO
CASSETTES



PATCH FIELD
FOR INCOMING
AND OUTGOING
FIBER
TERMINATIONS



The fiber termination field within the PON Pedestal eliminates congested splice trays. Each buffer tube is spliced in its own cassette and individual fibers are spliced on to pigtails/adapters for quick patching and routing. The designation card on the metal cover provides an easy-to-read visual guide for fiber identification. Since optical components are terminated, it is easy to replace or upgrade them without need for a splicing technician. Testing is also easier since the service jumper can be removed and an OTDR or Power meter can be plugged into the appropriate port for trouble shooting. Disturbing other fibers is not necessary.

As more MSO's begin to deploy multiple fiber technologies in the OSP, they will be looking for a coherent method for organizing their fiber. The PON pedestal is an excellent solution.