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# AT&T Open Fiber Distribution Hub Specification

Revision 1.0

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## Revision History

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## Scope

This document defines the technical specifications for the AT&T Open Fiber Distribution Hub (FDH) that will be used in the Optical Distribution Network (ODN) for Passive Optical Networks (PON).

FDHs are commonly deployed in the ODN of PONs. The FDH: terminates the feeder fiber cables from the Telco Central Office (CO); terminates the distribution fiber cables passing customer locations in the neighborhood; houses optical splitter modules, and provides the necessary fiber routing structures and frames to provide fiber connectivity from the feeder fiber cable through the optical splitter to the distribution fiber cable(s).

The Open FDH design will include:

- Outdoor versions for pole and pad mount.
- Indoor versions for rack and wall mount.
- The cabinet will include an EIA standard 19” rail system to support the following modules:
  - Feeder Fiber Cable Termination Panel
  - Distribution Fiber Cable Termination Panel
  - Termination Panel for unassigned Splitter Module “pigtailed” (sometimes called the Parking Lot)
  - “Pass through” functionality (which allows bypassing the optical splitter when connectivity is required for point to point systems) will be achieved by placing a fiber jumper from any Feeder Fiber Termination Panel port to any Distribution Fiber Termination Panel port
    - “Pass through” jumpers to use the same route path as optical splitter legs
  - Splitter Module Frame to house optical splitter modules
- The cabinet housing functionality will include:
  - Fiber Management functionality
  - Bonding and grounding requirements
    - The cabinet must accommodate #6 solid ground wire equipped with #6 compression ring lug for the cabinet. Each incoming and outgoing cable must be separately grounded to a bus bar using stranded #6 equipped with a ground lug.
  - Door or doors for front access
  - Door, panels that swing open, or removable panel for rear access

Important FDH size dimensions include:

- Feeder Fiber Termination capacity
- Distribution Fiber Termination capacity
- Termination capacity for unassigned Splitter Module “pigtailed”
- Number of Splitter Modules that can be housed in the Splitter Module Frame
- Maximum height of the cabinet

The dimensioning of an FDH is typically described by the Distribution Fiber Termination capacity. For example, an FDH 864 would be able to terminate 864 distribution fiber strands. This specification will

include three FDH sizes: Large FDH (supporting 864 distribution fiber strands); Medium FDH (supporting 432 distribution fiber strands); and, Small FDH (supporting 288 distribution fiber strands).<sup>1</sup>

The architecture of the Open FDH is shown in Figure 1.

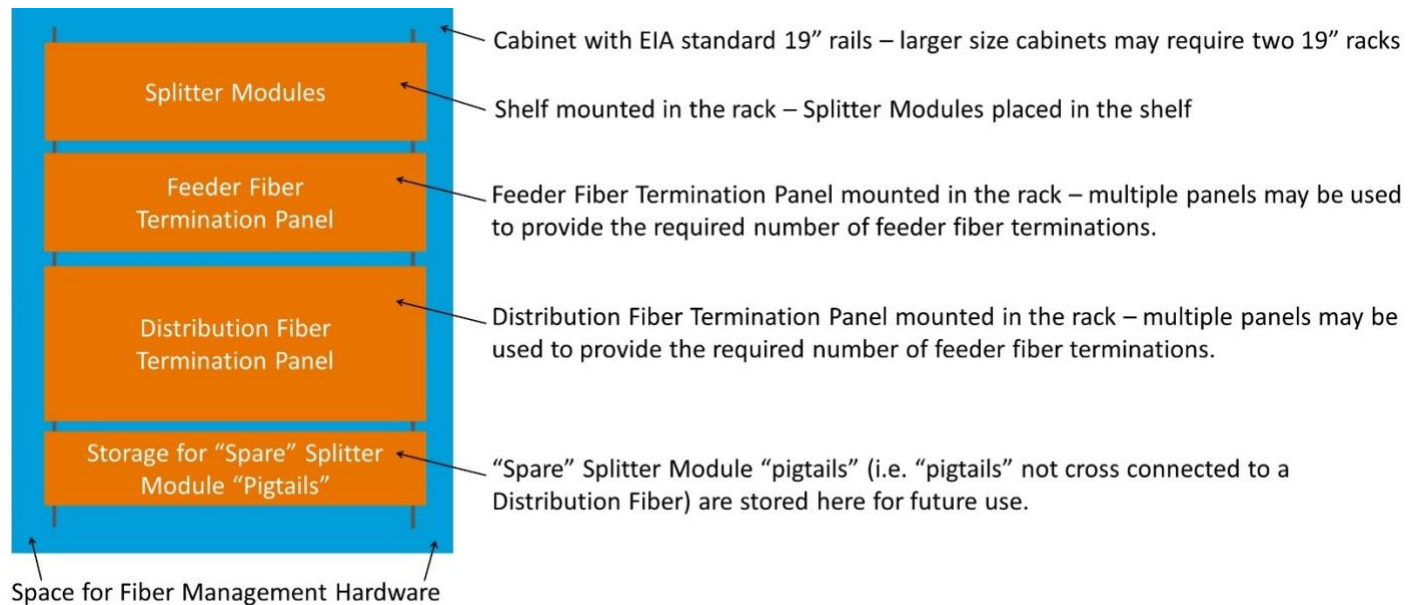


Figure 1 – High Level Architecture of Open FDH

## Cabinet

The cabinet is the housing and supporting structure for all other components (e.g. Feeder Fiber Cable Termination Panel, Distribution Fiber Cable Termination Panel, Termination Panel for unassigned Splitter Module "pigtails", Splitter Module Frame) of the FDH.

Pad mount outdoor cabinets, pole mount outdoor cabinets, wall mount indoor cabinets, and indoor racks are required in three sizes: Large, Medium, and Small. Cabinets must not exceed the following maximum heights: Large 72"; Medium 40"; and, Small 34". The cabinet depth shall be at least 16" but less than 18" and the cabinet width shall be at least 30" but less than 36".

Cabinets and indoor frames will utilize EIA standard 19" racks to facilitate a modular design for

adding PFP functionality (e.g. Feeder Fiber Termination Panels, Distribution Fiber Termination Panels, Splitter Modules Frames).

The cabinet must accommodate #6 solid ground wire equipped with #6 compression ring lug for the cabinet. Each incoming and outgoing cable must be separately grounded to a bus bar using stranded #6 equipped with a ground lug.

Cabinet/pad combination must withstand 150 mph wind without turning over per most current version of GR-487 or GR-3125.

Where applicable, outdoor pad mount and pole mount cabinets shall meet the criteria in the most current published version of:

- GR-3125 Outdoor Fiber Distribution Hubs
- GR-2898 Generic Requirements for Fiber Demarcation Boxes
- GR-487 Generic Requirements for Electronic Equipment Cabinets
- GR-63 NEBS Requirements for Physical Protection
- GR-326 Generic Requirements for Single Mode Optical Connectors and Jumper Assemblies
- GR-1209 Generic Requirements for Passive Optic Components
- GR-1221 Generic Reliability Assurance Requirements for Passive Optic Components

Where applicable, indoor wall mount cabinets and indoor racks shall meet the criteria in the most current published version of:

- GR-63 NEBS Requirements for Physical Protection
- GR-449 Generic Requirements and Design Considerations for Fiber Distributing Frames
- GR-3123 Generic Requirements for Indoor Fiber Distribution Hubs
- GR-326 Generic Requirements for Single Mode Optical Connectors and Jumper Assemblies
- GR-1209 Generic Requirements for Passive Optic Components
- GR-1221 Generic Reliability Assurance Requirements for Passive Optic Components

## **Feeder Fiber Distribution Panel**

The modular Feeder Fiber Termination Panel shall be designed to mount in 19" racks in the FDH cabinets and indoor racks. The Feeder Fiber cable strands will be terminated to the panel such that access to the fiber strands are via an SC/APC (Angle Polish Connector) adapter incorporated into the panel. Versions of the Feeder Fiber Termination Panel with and without pre-terminated fiber cable tails are required. The fiber cables will be a ribbon type cable. Armored cables are required for pad mount cabinets, dielectric cables are required for pole mount cabinets, and interior OFNR with riser cable stubs are required for indoor FDHs. Two stubs lengths must be available: 50 meters and 100 meters. The number of feeder fiber terminations required for each FDH size are: Large 288 fiber strands; Medium 144 fiber strands; and, Small 72 fiber strands.

Where applicable, Feeder Fiber Distribution Panels shall meet the criteria in the most current published version of:

- GR-3125 Outdoor Fiber Distribution Hubs
- GR-2898 Generic Requirements for Fiber Demarcation Boxes
- GR-487 Generic Requirements for Electronic Equipment Cabinets
- GR-63 NEBS Requirements for Physical Protection
- GR-449 Generic Requirements and Design Considerations for Fiber Distributing Frames
- GR-3123 Generic Requirements for Indoor Fiber Distribution Hubs
- GR-326 Generic Requirements for Single Mode Optical Connectors and Jumper Assemblies
- GR-1209 Generic Requirements for Passive Optic Components
- GR-1221 Generic Reliability Assurance Requirements for Passive Optic Components

The SC/APC adapter in the Feeder Fiber Distribution Panel shall meet the Telecommunications Industry Association (TIA) Fiber Optic Connector Intermateability Standards (FOCIS) TIA-604-03.

## **Distribution Fiber Distribution Panel**

The modular Distribution Fiber Termination Panel shall be designed to mount in 19" racks in the FDH cabinets and indoor racks. The Distribution Fiber cable strands will be terminated to the panel such that access to the fiber strands are via an SC/APC adapter incorporated into the panel. Versions of the Distribution Fiber Termination Panel with and without pre-terminated fiber cable tails are required. The fiber cables will be a ribbon type cable. Armored cables are required for pad mount cabinets, dielectric cables are required for pole mount cabinets, and interior OFNR with riser cable stubs are required for indoor FDHs. Two stubs lengths must be available: 50 meters and 100 meters. The number of feeder fiber terminations required for each FDH size are: Large 864 fiber strands; Medium 432 fiber strands; and, Small 288 fiber strands.

Where applicable, Distribution Fiber Distribution Panels shall meet the criteria in the most current published version of:

- GR-3125 Outdoor Fiber Distribution Hubs
- GR-2898 Generic Requirements for Fiber Demarcation Boxes
- GR-487 Generic Requirements for Electronic Equipment Cabinets
- GR-63 NEBS Requirements for Physical Protection
- GR-449 Generic Requirements and Design Considerations for Fiber Distributing Frames
- GR-3123 Generic Requirements for Indoor Fiber Distribution Hubs
- GR-326 Generic Requirements for Single Mode Optical Connectors and Jumper Assemblies
- GR-1209 Generic Requirements for Passive Optic Components
- GR-1221 Generic Reliability Assurance Requirements for Passive Optic Components

The SC/APC adapter in the Distribution Fiber Distribution Panel shall meet the TIA FOCIS TIA-604-03.

## **Terminal Panel for Unassigned Splitter Module Pigtails**

The modular Termination Panel for Unassigned Splitter Module Pigtails shall be designed to mount in 19" racks in the FDH cabinets and indoor racks. The panel requires an SC/APC adapter incorporated into the panel for each pigtail termination; 144 pigtail terminations required for each FDH size.

Where applicable, the Termination Panel for Unassigned Splitter Module Pigtails shall meet the criteria in the most current published version of:

- GR-3125 Outdoor Fiber Distribution Hubs
- GR-2898 Generic Requirements for Fiber Demarcation Boxes
- GR-487 Generic Requirements for Electronic Equipment Cabinets
- GR-63 NEBS Requirements for Physical Protection
- GR-449 Generic Requirements and Design Considerations for Fiber Distributing Frames
- GR-3123 Generic Requirements for Indoor Fiber Distribution Hubs
- GR-326 Generic Requirements for Single Mode Optical Connectors and Jumper Assemblies
- GR-1209 Generic Requirements for Passive Optic Components
- GR-1221 Generic Reliability Assurance Requirements for Passive Optic Components

## **Splitter Module Frame**

The Splitter Module Frame shall be designed to mount in 19" racks in the FDH cabinets and indoor racks. The Splitter Module Frame will house Splitter Modules with a 118 mm LGX form factor. The number of splitter module frames required for each FDH size are: Large 3 splitter module frames; Medium 2 splitter module frames; and, Small 1 splitter module frame.

## **Splitter Module**

The Splitter Module houses the Optical Splitter Chip in a 118 mm LGX form factor. The Splitter Modules will be slotted in the Splitter Module Frame. The Splitter Module shall utilize pigtails with SC/APC connectors for both the feeder side (input port) connection and the distribution side (output ports) connections. The SC/APC connector on the Splitter Module pigtail shall meet the TIA FOCIS TIA-604-03. The pigtails shall have a 2.0 mm diameter outside jacket 1.5 m in length. All pigtails shall be front access (i.e. routed through the faceplate of the LGX compatible module) and be continuous, un-spliced, fiber from the butt-splice-to-PLC transition to the terminated connector of both the input and output legs of the device.



The 118 mm LGX form factor should use a metallic restraining pins to provide a more robust design for placement in the outside plant environment.

Four types of splitter modules are required: 1x8; 1x16; 1x32; and, 1x64. For 1x8 and 1x16 splitters, two optical chips and associated pigtails can be housed in a single 118 mm LGX module (i.e. two optical splitters per form factor). For 1x32 splitters, one optical chip and associated pigtails can be housed in a single 118 mm LGX module. For 1x64 splitters, a double wide 118 mm LGX form factor is required to house one optical chip and associated pigtails.

The Splitter Module optics and form factor shall conform to the following:

- The wavelength bandpass of the splitter module optics shall be 1260 nm to 1650 nm.
- The 1x8 splitter module maximum insertion loss with connectors must be less than or equal to 11.3 dB.
- The 1x16 splitter module maximum insertion loss with connectors must be less than or equal to 14.3 dB.
- The 1x32 splitter module maximum insertion loss with connectors must be less than or equal to 17.6 dB.
- The 1x64 splitter module maximum insertion loss with connectors must be less than or equal to 21.2 dB.
- Splitter uniformity shall be less than or equal to 1.8 dB.
- The directivity of the device shall be less than or equal to -55 dB.
- Splitter return loss shall be less than or equal to -55 dB.
- The polarization dependent loss shall be less than or equal to 0.4 dB.
- Each device will be marked with the supplier name, a unique serial number with barcode, the CLEI code, and a vendor defined component identification code.
- The device must comply with latest version of GR-1209-CORE Passive Optical Compliant Testing.
- The device shall remain functional within a temperature range of -40° C to +70° C and a relative humidity range of 5% to 95%.
- The device must comply with latest version of GR-326-CORE Generic Requirements for Single-Mode Optical Connectors and Jumper Assemblies.

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<sup>1</sup> This Specification encourages the use of modular building blocks for the panels, Splitter Module Frame, and Splitter Modules. Such a design could easily support additional FDH sizes.