GigaVUE-OS Cabling Guide

GigaVUE-OS

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Change Notes

When a document is updated, the document version number on the cover page will indicate a new version and will provide a link to this Change Notes table, which will describe the updates.

Product Version	Document Version	Date Updated	Change Notes
5.10.00	1.0	8/17/2020	Original release of this document with 5.10.00 Limited Availablilty release.

Contents

GigaVUE-OS Cabling

This guide provides guidelines to the different types of cables to be used to connect the Gigamon devices as well as connect Gigamon devices to third-party devices. You can determine the cable type based on the transceiver you use with the 100Gb/40Gb/10Gb/1Gb ports in GigaVUE node's ports.

Refer to the following sections for details:

- Introduction to Cables
- Cabling—Examples
- Troubleshooting and Best Practices

Introduction to Cables

This chapter provides the list of the different types of cables and their specifications. The cable connectivity differs based on the transceiver type you use. Refer to the "*Transceiver and Cable Matrix*" tab in the *GigaVUE-OS Compatibility and Interoperability Matrix* for compatibility information.

Refer to the following sections:

- Cable Naming Conventions
- Cable Types and Specifications

Cable Naming Conventions

Cable Names	Description
MPO	Multi-fiber Push On
MTP	A high performance MPO connector
APC	Angled Physical Contact or Angled Polished Connector. It has an end face that is polished at an 8-degree angle.
UPC	Ultra Physical Contact or Ultra Polished Connector. It has an end face that is polished with no angle.
LR	Long range
SR	Short range
LC	Lucent Connectors
DAC	Direct Attach Cable
MM	Multimode
SM	Singlemode
SMF	Singlemode Fiber
MMF	Multimode Fiber

Cable Types and Specifications

Table 1: Identify Cables lists the standards, cable types, and specifications.

Table 1: Identify Cables

Standard	Cable Type	Specifications
• 40G ESR4 • 40G/100G SR	MPO/UPC (f) to MPO/UPC (f) Multimode Patch Cable Type B **NOTE:** Gigamon recommends that you use female MPO connector of cable type B, which is a cross-over cable. The female MPO connectors are in Key up position at both ends.	12 Core, Multimode (50/125μm)
• 100G SR10	MPO/UPC (f) to MPO/UPC (f) Multimode Patch Cable Type B	24 Core, Multimode (50/125μm)
• 100G CWDM4 • 40G/100G LR • 1G/10G/25G LR	LC/UPC to LC/UPC Duplex Singlemode Patch Cable	SMF, (8-10.5μm)
• 40G /100G PLR4	MPO/APC (f) to [4] LC/UPC Duplex Single Mode Fanout Cable	• MPO: 12 Core • LC: SMF
• 40G SR	MPO/UPC (f) to [4] LC/UPC Duplex Multimode Fanout Cable	• MPO: 12 Core • LC: Multimode
• 1G/10G/25G SR	LC/UPC to LC/UPC Duplex Multimode Patch Cable	Multimode (50/125μm) • OM2: Orange or slate color • OM3: Aqua color • OM4: Aqua or violet color • OM5: Lime green color

Standard	Cable Type	Specifications
• 10G	Direct Attach Cable - CBL-205	
• 1G Cu	Cat5, Cat6, Cat6A, or Cat7 Cables with RJ-45 Connectors	
• 10G Cu	Cat6A or Cat7 Cables with RJ-45 Connectors	

Cabling—Examples

This chapter provides examples of how to cable Test Access Points (TAPs), breakout panels, and devices. Refer to the following section for details:

- How to Cable a TAP to a Linecard
- How to Connect a Breakout Panel to an Inline Bypass Module

How to Cable a TAP to a Linecard

Before you cable a TAP to a linecard, you must understand how a TAP works. Also, you must determine whether you require a formal cabling plan.

Refer to the following sections for details:

- How a TAP Works
- Create a Formal Cabling Plan
- Cable a TAP to a Linecard

How a TAP Works

A physical network TAP leverages hardware to copy traffic that travels between two devices—a network switch, a router, or an endpoint device to a secondary monitoring device, which is typically used for security or analytics. Most fiber TAPs are passive, that is, they do not require any power supplies, software, or configurations. Gigamon TAPs are the first step to visibility and offer perfect copies of all traffic at full bandwidth.

Network fiber cables can be considered as a pair of long strands of fiberglass used to pass light from one point to another. These cables are passive.

The transceivers, such as a Small Form-factor Pluggable (SFP), transmit and receive traffic. Transceivers have two primary components—an LED or a Laser to generate light signals and a light-sensitive receiver to capture the light signals. Since the LED or laser transmits the light signals, it is considered as Tx, while the light-sensitive receiver captures the light signals, it is considered as Rx. These two strands are separated at the place where the connections meet the transceiver. Every Tx leaving a device needs to be received by an Rx on the other end.

Most transceivers have arrows showing the physical direction of the traffic or light signal that is coming in (Rx) or going out (Tx) of the component. Refer to Figure 1: Transceiver With Incoming and Outgoing Arrows.

Figure 1: Transceiver With Incoming and Outgoing Arrows

A passive fiber TAP does not contain any lasers or transceivers of its own. Instead, the TAP physically resides between the two devices that are being monitored as strands of fiber. Hardware splitter components within the TAP split a portion of the light that is transmitted from each direction, to a pair of separate monitor fibers, thus creating continuous copies of all traffic traversing the original links.

For each link that is tapped, a TAP will use three duplex ports, or connections. Figure 2: Cabling two devices with a TAP illustrates how a router and a switch is connected through a TAP.
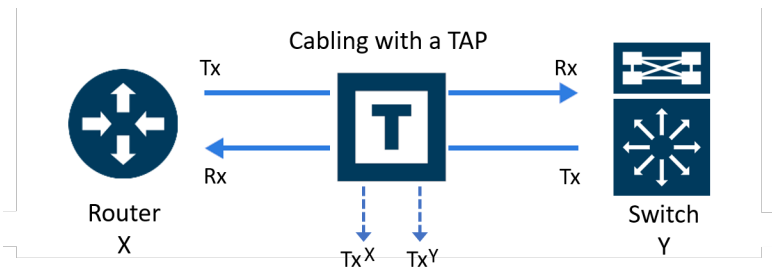
Figure 2: Cabling two devices with a TAP

Let us name the port in the TAP that is connected to the Router as X and the port that is connected to the Switch as Y. Since these ports are duplex, each port will have a Tx and Rx subconnection. The third port connection on the TAP is different. It is reserved for the monitored traffic that has been copied. Therefore, both sides of this connection contain transmit traffic, Tx^X and Tx^Y (Refer to Figure 3: Tx and Rx Subconnection in TAP's Ports).
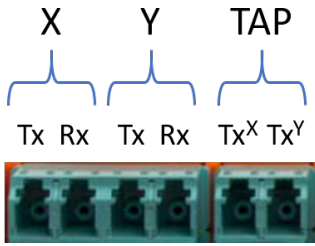
Figure 3: Tx and Rx Subconnection in TAP's Ports

Create a Formal Cabling Plan

When cabling multiple TAPs for larger installations, you may lose track of cabling. It is recommended to adhere to a formal cabling plan. A cabling plan is a matrix that provides information about where every cable endpoint is connected. It includes detailed physical locations specifying the port that resides in a specific module, within a given slot, on a chassis that is on a specific RU within a given rack.

When you create a cabling plan, you must adhere to a nomenclature that allows you to understand the different slots in a TAP's chassis or module. Figure 4: G-TAP M Series TAP-M200 chassis with Nomenclature for Slots illustrates the slot nomenclature for the G-TAP M Series TAP-M200 chassis that has 6 slots.

Figure 4: G-TAP M Series TAP-M200 chassis with Nomenclature for Slots

Figure 5: G-TAP M Series Module with Nomenclature for Six TAPs and LC Connectors illustrates the nomenclature for the G-TAP M Series TAP-M251 module.
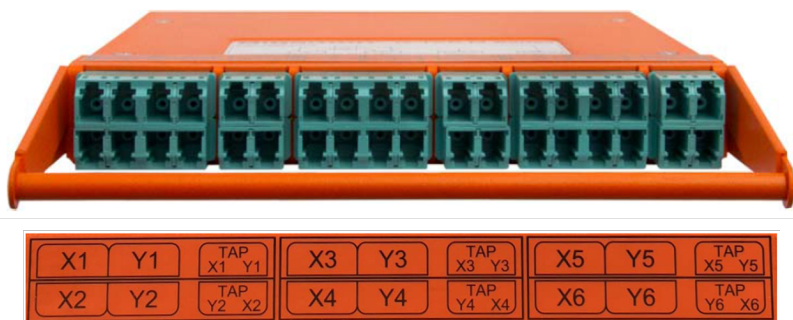
Figure 5: G-TAP M Series Module with Nomenclature for Six TAPs and LC Connectors

Figure 6: Suggested Categories for the Cabling Plan illustrates the suggested categories to create a cabling plan.
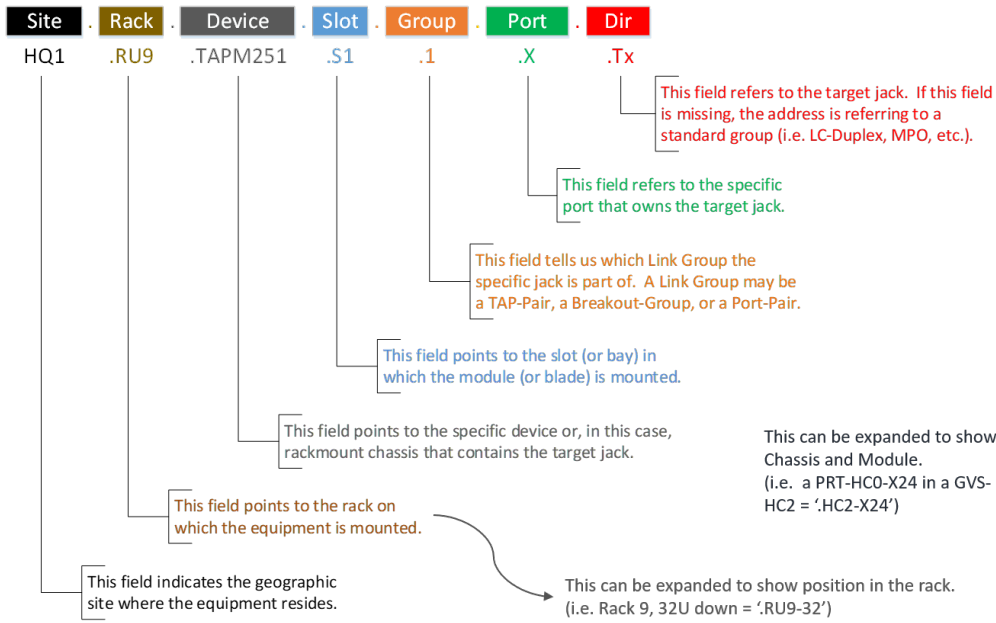
Figure 6: Suggested Categories for the Cabling Plan

Figure 7: Example of a Cabling Plan illustrates an example of a cabling plan to connect a monitoring port located in Slot 2 and Group 2 of the TAP-M251 to a network port, which is the second port in the PRT-HC0-X24 linecard that is located in Slot 2 of the GigaVUE-HC2 device that receives traffic.

Figure 7: Example of a Cabling Plan

Cable a TAP to a Linecard

For illustration purposes, this procedure uses the G-TAP M Series TAP-M251 module as an example. The TAP-M251 uses LC connections. As with most cabled devices, the top row is keyed at the top and the bottom row is keyed at the bottom to enable easy snap connections. The Tx and Rx ports are reversed on the bottom row. The TAP-M251 cabling setup is identical to that of the TAP-M271, TAP-M273, TAP-M453, and TAP-M473 modules. Although the TAP-M451, TAP-M471, and TAP-M471-SR10 use the larger MPO/MTP connections and tap fewer connections per module, the general cabling concepts still apply, except the output connections are not broken apart. The BiDi TAP module TAP-M506A works similarly. The patch panel modules PNL-M341 and PNL-M343 are not TAPs and are not covered here. For information regarding the patch panel cabling, general racking, or module insertion, refer to the *G-TAP M Series Hardware Guide*.

To cable a TAP-M251 to a Linecard:

1. Connect a dual fiber cable from the X network device to the first dual LC connector on the TAP-M251.

> **NOTE:** LC connectors are keyed and will only fit in one direction. Ensure that the dual fiber cable matches the transceiver in use. Refer to the "*Transceiver and Cable Matrix*" tab in the *GigaVUE-OS Compatibility and Interoperability Matrix* for details.

   a. If you are breaking an existing link:

      • Schedule a maintenance window because disconnecting cables causes an active link to go down.
      • Prior to unplugging cables, log into the device and jot down the port stats information to verify how much traffic is expected.

   b. Verify the port on device X is up, and traffic is flowing as expected. Ensure that device X is powered on.

   c. Verify light is passing to the TAP's first LC monitor connection.

> **NOTE:** Use the Camera application on your mobile device to verify active connections are working. Never look at the laser light with the naked eye. When the link is up on the device X, the first LC connector that monitors the link will show red as shown in Figure 8: Red Light Passing to the First LC Connector. The example shown here is using 10G MM, which is in the visible light spectrum. Higher bandwidths will not be seen with the naked eye.
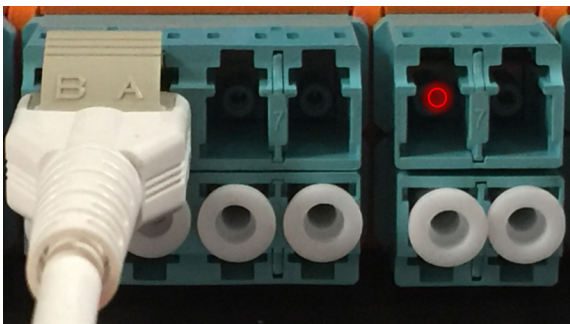
Figure 8: Red Light Passing to the First LC Connector

2. Connect a dual fiber cable from the Y network device to the second dual LC connector on the TAP.

   a. Verify the port on device Y is up, and the traffic is flowing as expected. Ensure that device Y is powered on.

   b. Verify light is passing to the TAP's second LC monitor connection as shown in Figure 9: Red Light Passing to the First and Second LC Connectors.
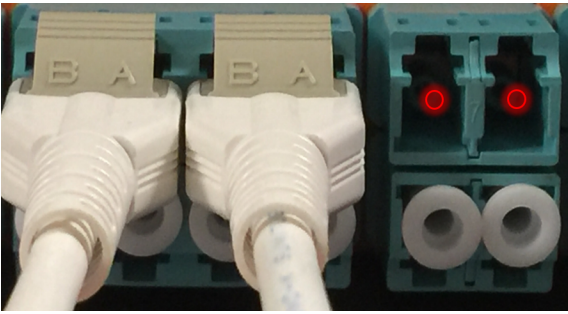
Figure 9: Red Light Passing to the First and Second LC Connectors

3. Connect cables to the TAP's third pair of LC connections using cabling that can be separated into two LC connections.

> **NOTE:** These are monitoring ports with copies of the traffic moving between the X and Y devices. Both sides of this connection contain transmit traffic, Tx^X and Tx^Y. For more information, refer to How a TAP Works.

   a. When you connect the other ends of the single fiber cable to the GigaVUE node, make sure you only connect to the receiving half (Rx) of the network port. As specified earlier, transceivers have arrows indicating traffic direction. Only connect to the side of the transceiver with the arrow pointing in, to receive the traffic. Leave the transmitting half (Tx) of the port unconnected. Refer to Figure 10: LC Connectors, Figure 11: LC Connectors connected to TAP, and Figure 12: LC Connectors connected to GigaVUE Node.
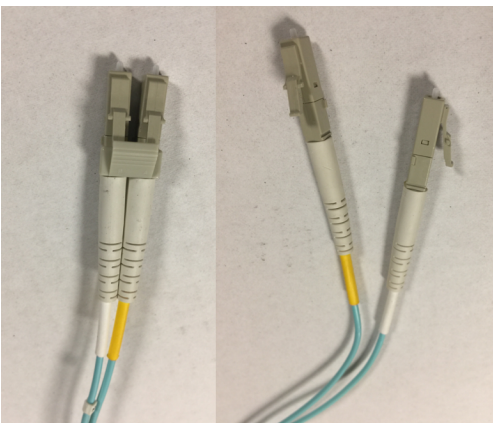
Figure 10: LC Connectors
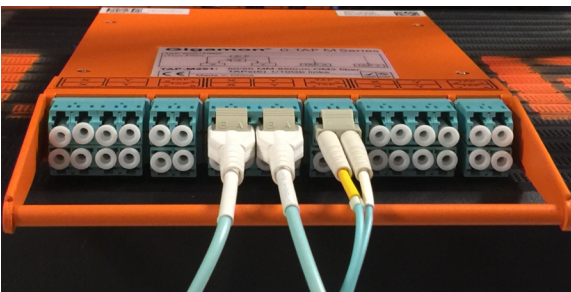
Figure 11: LC Connectors connected to TAP
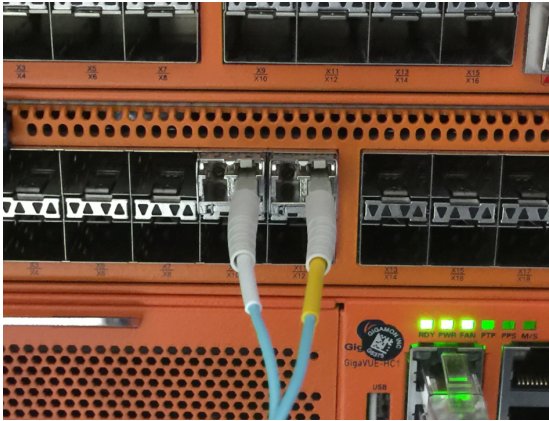
Figure 12: LC Connectors connected to GigaVUE Node

b. Re-verify both X and Y devices have links up and are working properly.

c. Verify the GigaVUE node has both incoming links up and is receiving appropriate traffic.

How to Connect a Breakout Panel to an Inline Bypass Module

Figure 13: Connecting Breakout Panel to Inline Bypass Module illustrates how to connect a PNL-M341 breakout panel to a BPS-HC3-C25F2G bypass combo module of GigaVUE-HC3.
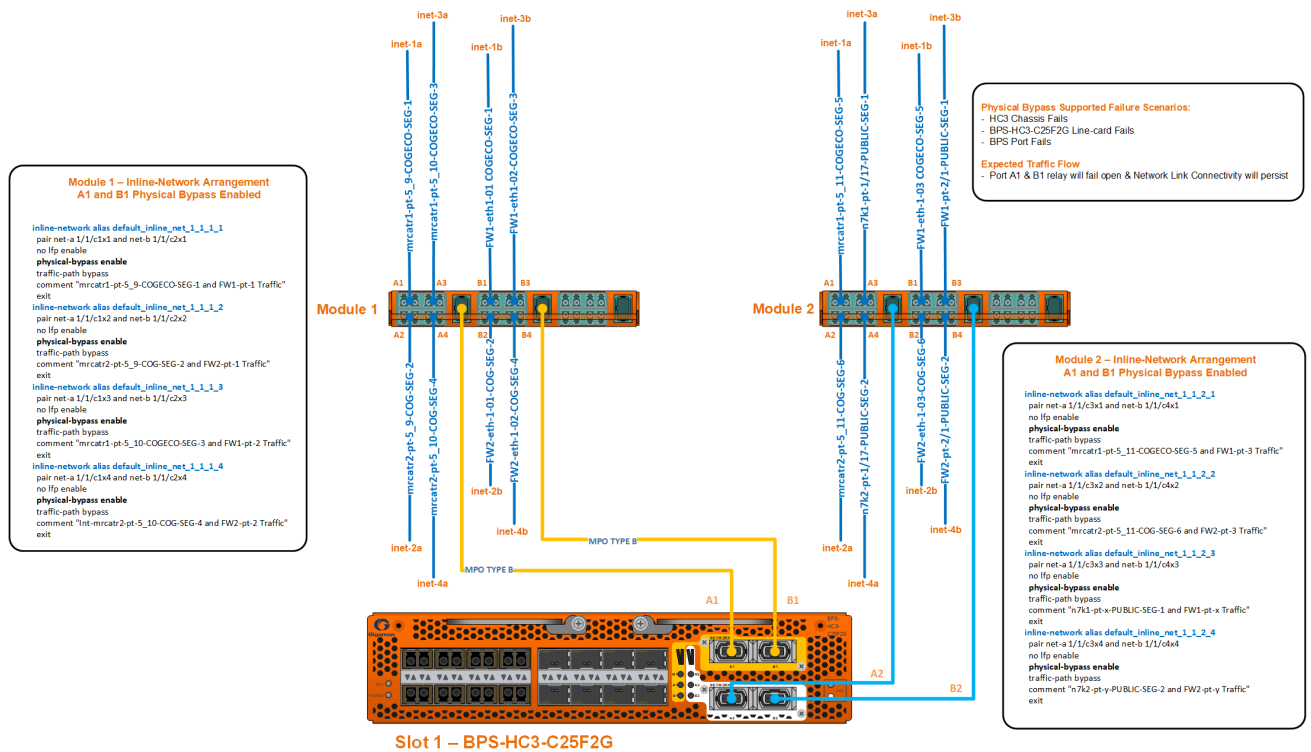
Figure 13: Connecting Breakout Panel to Inline Bypass Module

The diagram depicts the A1 and B1 inline network mapping between 40Gb A1 and 40Gb B1 to 4x10Gb (A1 to A4 and B1 to B4) breakout ports. The inline network mapping for the breakout ports must be:

- A1 to B1
- A2 to B2
- A3 to B3
- A4 to B4

The diagram also outlines the various failure scenarios that physical bypass supports and the expected traffic flow.

Troubleshooting and Best Practices

This appendix provides information about some of the common issues that you may face when cabling TAPs and how to troubleshoot the issues. It also lists few best practices that you must follow to ensure smooth cabling. Refer to the following sections for details:

- Common Issues and Troubleshooting
- Generic Troubleshooting Steps
- Best Practices

Common Issues and Troubleshooting

This section lists few common issues that you may face when cabling TAPs and how to troubleshoot the issues.

Table 5-1: Common Issues and Troubleshooting

Common Issues	Description	Troubleshooting Tips
Misconnected cabling or using wrong cable types	Sometimes, cables may be mislabeled due to which you may have plugged in the wrong cable.	Each transceiver is designed and optimized to work with specific cables for specified distances. Ensure that you connect the appropriate transceivers and cables on both ends. Refer to the *"Cable Matrix for Copper TAPs and Fiber TAPs"* in the *GigaVUE-OS Compatability and Interoperability Matrix*.
Failure to breakout monitored links	There may be instances when the switch and router connections that use standard duplex cabling are not broken out into simplex fiber cables on the receiving end.	Ensure that both monitor links are broken out into simplex fiber cables and are individually attached to the Rx connections on the receiving end.
Flipped connections	Sometimes, a duplex cable may not be crossed properly such that the Tx on one end is connected to the Rx on the other end. The issue could be anywhere along the cabling path or the patch panels, which means that the light is not passing through the cable.	Disconnect the plastic housing and flip the LC connections on one end of the connection.
Mismatched transceivers	The transceiver type used on both ends of the connection is not identical.	Ensure that the transceiver type is identical on both ends of the connection. For example, a 10G LR4 transceiver that sends traffic from one end must be paired with the same transceiver type on the receiving end.
Dirty connections	Dust, dirt, and oils all inhibit light and cause poor connections.	Use new cables with dust caps. Clean all connections before use. Refer to the Best Practices.

Common Issues	Description	Troubleshooting Tips
Bad transceivers	A transceiver is an electronic component that is designed to transmit and receive light. It can malfunction.	Always keep spare transceivers and replace them as required.
Bad TAPs	Passive TAPs are the most reliable networking and security products available because they contain a minimal number of components and do not require any software. But like any hardware, a TAP could be defective.	Always keep spare TAPs and replace them as required.
Crimped Cabling	If a bend is too tight, the fiber will not be able to properly transmit the signal.	Ensure that the bends in the cabling are not tight so that the fiber transmits signal properly.
Bad connections	Light degrades at given rates over distance. Light may also degrade with too many connections. Both these scenarios may cause bad connections	Do not exceed specified maximum distances. Be aware light degrades with each connection; use as few patch panels as possible.

Generic Troubleshooting Steps

Most TAP failures are due to improper cabling. To troubleshoot a TAP failure, you must ensure that the light is not impeded or broken along the way from the beginning till the end of the connection. Figure 5-1: Troubleshoot Generic TAP Issues is a flow chart that illustrates the generic steps to troubleshoot TAP failures. Follow the steps provided in the flow chart to isolate the issue and take corrective action.
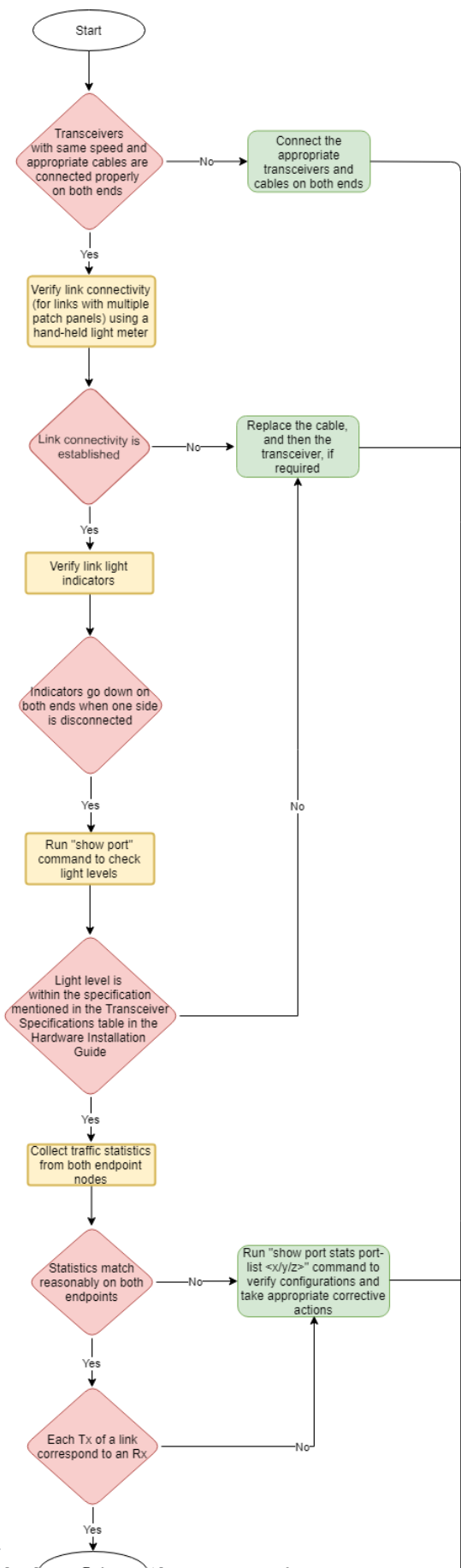
```
                    ┌─────────┐
                    │  Start  │
                    └─────────┘
                         │
                         ▼
              ◇ Transceivers          ┌──────────────┐
              with same speed    ─No→ │ Connect the  │
              and appropriate         │ appropriate  │
              cables are              │ transceivers │
              connected properly      │ and cables   │
              on both ends ◇          │ on both ends │
                         │            └──────────────┘
                        Yes
                         │
                         ▼
              ┌──────────────────┐
              │ Verify link      │
              │ connectivity     │
              │ (for links with  │
              │ multiple patch   │
              │ panels) using a  │
              │ hand-held light  │
              │ meter            │
              └──────────────────┘
                         │
                         ▼
              ◇ Link connectivity     ┌──────────────┐
              is established ◇  ─No→  │ Replace the  │
                         │            │ cable, and   │
                        Yes           │ then the     │
                         │            │ transceiver, │
                         ▼            │ if required  │
              ┌──────────────────┐    └──────────────┘
              │ Verify link light│
              │ indicators       │
              └──────────────────┘
                         │
                         ▼
              ◇ Indicators go down
              on both ends when one
              side is disconnected ◇
                         │
                        Yes
                         │
                         ▼
              ┌──────────────────┐
              │ Run "show port"  │
              │ command to check │
              │ light levels     │
              └──────────────────┘
                         │
                         ▼
              ◇ Light level is
              within the specification
              mentioned in the Transceiver
              Specifications table in the
              Hardware Installation Guide ◇
                         │
                        Yes
                         │
                         ▼
              ┌──────────────────┐
              │ Collect traffic  │
              │ statistics from  │
              │ both endpoint    │
              │ nodes            │
              └──────────────────┘
                         │
                         ▼
              ◇ Statistics match      ┌──────────────────┐
              reasonably on both ─No→ │ Run "show port   │
              endpoints ◇             │ stats port-list  │
                         │            │ <x/y/z>" command │
                        Yes           │ to verify        │
                         │            │ configurations   │
                         ▼            │ and take         │
              ◇ Each Tx of a link     │ appropriate      │
              correspond to an Rx ◇─No│ corrective       │
                         │            │ actions          │
                        Yes           └──────────────────┘
                         │
                         ▼
                    ┌─────────┐
                    │   End   │
                    └─────────┘
```

Troubleshooting and Best Practices
Generic Troubleshooting Steps

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Figure 5-1: Troubleshoot Generic TAP Issues

Best Practices

When connecting TAPs, ensure you adhere to the following best practices:

- Prior to connecting any cable, both the port and cable adapter must be cleaned as follows:
    - Clean each port on the TAP using the optical fiber cleaner pen prior to cable insertion.
    - Clean the MPO/MTP adapters using the MPO/MTP port cleaner pen.
    - Clean the LC adapters using the LC port cleaner pen.
    - Clean each cable adapter using the optical fiber cleaner cassettes prior to cable insertion.
    - Visually inspect cable adapter to ensure no dust particles are present on the adapter front.
    - If dust is clogged in the cable and it is not possible to clean, use a new cable.

- Port caps must be installed when ports on the TAP are not in use.

> **NOTE:** The G-TAP models M471 and M471-SR10 are highly susceptible to dust. Properly clean all connections before use.

Additional Sources of Information

This appendix provides additional sources of information. Refer to the following sections for details:

- Documentation
- Documentation Feedback
- Contact Technical Support
- Contact Sales
- The Gigamon Community

Documentation

The following table provides a list of the additional documentation provided for GigaVUE H Series and TA Series nodes. "*" indicates new documents in this release. "**" indicates documents that are renamed in this release.

> 🗋 **NOTE**: Release Notes are not included in the online documentation. Registered Customers can download the Release Notes from the Software & Docs page on to My Gigamon. Refer to How to Download PDFs from My Gigamon.

> 🗋 **TIP**: If you keep all PDFs for a particular release in common folder, you can easily search across the doc set by opening one of the files in Acrobat and choosing **Edit > Advanced Search** from the menu. This opens an interface that allows you to select a directory and search across all PDFs in a folder.

Table 1: Documentation Suite for Gigamon Products

Summary	Document
Hardware Installation Guides	
• how to unpack, assemble, rack-mount, connect, and initially configure the respective GigaVUE devices • reference information and specifications for the respective GigaVUE devices	****G-TAP A Series 2 Installation Guide**
	GigaVUE-HC1 Hardware Installation Guide
	GigaVUE-HC2 Hardware Installation Guide

Summary	Document
	GigaVUE-HC3 Hardware Installation Guide
	GigaVUE TA Series Hardware Installation Guide
Software Installation and Upgrade Guides	
• how to install GigaVUE-FM on VMware ESXi, MS Hyper-V, and KVM • how to migrate GigaVUE-FM on VMware ESXi, Hardware Appliance, and AWS	****GigaVUE-FM Installation, Migration, and Upgrade Guide**
• how to upgrade the embedded GigaVUE-OS on GigaVUE H Series and GigaVUE TA Series nodes	**GigaVUE-OS Upgrade Guide**
Administration Guide	
• how to administer the GigaVUE-OS and GigaVUE-FM software	**GigaVUE-OS and GigaVUE-FM Administration Guide**
Configuration and Monitoring Guides	
• how to install, deploy, and operate GigaVUE-OS • how to configure GigaSMART operations	**GigaVUE-FM User's Guide**
• how to deploy the GigaVUE Cloud Suite solution in any cloud platform	**GigaVUE Cloud Suite for AnyCloud Configuration Guide**
• how to configure the GigaVUE Cloud Suite components and set up traffic monitoring sessions for the respective cloud platform	**GigaVUE Cloud Suite for AWS Configuration Guide**
	GigaVUE Cloud Suite for AWS QuickStart Guide
	*GigaVUE Cloud Suite for AWS SecretRegions Configuration Guide
	GigaVUE Cloud Suite for Azure Configuration Guide
	GigaVUE Cloud Suite for Kubernetes Configuration Guide
	*GigaVUE Cloud Suite for Nutanix Configuration Guide
	GigaVUE Cloud Suite for OpenStack Configuration Guide
	GigaVUE Cloud Suite for VMware Configuration Guide
Reference Guides	
• library of GigaVUE-OS CLI (Command Line Interface) commands used to configure and operate GigaVUE H Series and TA Series devices	**GigaVUE-OS-CLI Reference Guide**

Summary	Document
• guidelines for the different types of cables used to connect Gigamon devices	**GigaVUE-OS Cabling Quick Reference Guide**
• compatibility information and interoperability requirements for Gigamon devices	**GigaVUE-OS Compatibility and Interoperability Matrix**
• samples uses of the GigaVUE-FM Application Program Interfaces (APIs)	**GigaVUE-FM REST API Reference in GigaVUE-FM User's Guide**
Release Notes	
• new features, resolved issues, and known issues in this release • important notes regarding installing and upgrading to this release	**GigaVUE-OS, GigaVUE-FM, GigaVUE-VM, and GigaVUE Cloud Suite Release Notes**
In-Product Help	
• how to install, deploy, and operate GigaVUE-OS. Provided from the GigaVUE-OS interface.	**GigaVUE-FM Online Help**
• the web-based GUI for the GigaVUE-OS. Provided from the GigaVUE-OS H-VUE interface.	**GigaVUE-OS H-VUE Online Help**

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How to Download PDFs from My Gigamon

To download release-specific PDFs:

1. Log in to My Gigamon
2. Click on the **Software & Documentation** link.
3. Use the **Product** and **Release** filters to find documentation for the current release. For example, select Product: "GigaVUE-FM" and Release: "5.7," enter "pdf" in the search box, and then click **GO** to view all PDF documentation for GigaVUE-FM 5.7.xx.

Documentation Feedback

To send feedback and report issues in our documentation, complete the short survey at the following link:

https://www.surveymonkey.com/r/gigamondocumentationfeedback

Contact Technical Support

See https://www.gigamon.com/support-and-services/contact-support for Technical Support hours and contact information. You can also email Technical Support at support@gigamon.com.

Contact Sales

Use the following information to Gigamon channel partner or Gigamon sales representatives.

Telephone: +1.408.831.4025

Sales: inside.sales@gigamon.com

Partners: www.gigamon.com/partners.html

Premium Support

Email Gigamon at inside.sales@gigamon.com for information on purchasing 24x7 Premium Support. Premium Support entitles you to round-the-clock phone support with a dedicated Support Engineer every day of the week.

The Gigamon Community

The Gigamon Community is a technical site where Gigamon users, partners, security and network professionals and Gigamon employees come together to share knowledge and expertise, ask questions, build their network and learn about best practices for Gigamon products.

Visit the Gigamon Community site to:

- Find knowledge base articles and documentation
- Ask and answer questions and learn best practices from other members.
- Join special-interest groups to have focused collaboration around a technology, use-case, vertical market or beta release
- Take online learning lessons and tutorials to broaden your knowledge of Gigamon products.

- Submit and vote on feature enhancements and share product feedback. (Customers only)

- Open support tickets (Customers only)

- Download the latest product updates and documentation (Customers only)

The Gigamon Community is a great way to get answers fast, learn from experts and collaborate directly with other members around your areas of interest.

Register today at community.gigamon.com

Questions? Contact our Community team at community.gigamon.com