GigaVUE-OS Cabling Quick Reference Guide

Version 5.7.00

DOCUMENT REVISION – 8/12/19

Contents

1 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:

2 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* on page 5
- *Cable Types and Specifications* on page 6

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 2-1 lists the standards, cable types, and specifications.

Table 2-1: 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 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
• 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	

3 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

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

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 3-1.

Figure 3-1: 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 3-2 illustrates how a router and a switch is connected through a TAP.

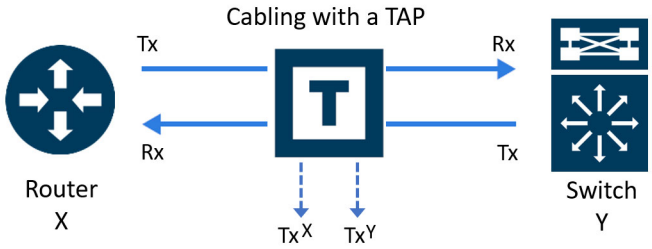

Figure 3-2: Cabling two devices with a TAP

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 3-3).

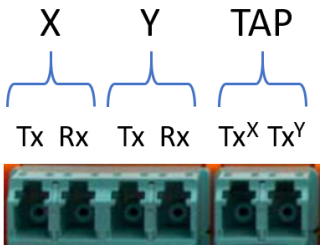

Figure 3-3: Tx and Rx Subconnection in TAP's Ports

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 3-4 illustrates the slot nomenclature for the G-TAP M Series TAP-M200 chassis that has 6 slots.

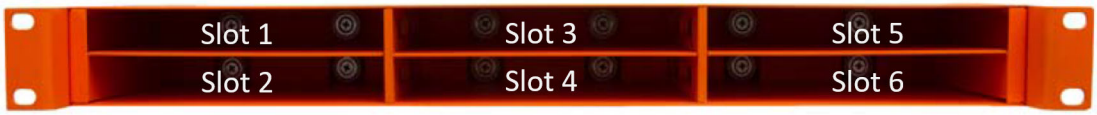

Figure 3-4: G-TAP M Series TAP-M200 chassis with Nomenclature for Slots

Figure 3-5 illustrates the nomenclature for the G-TAP M Series TAP-M251 module.

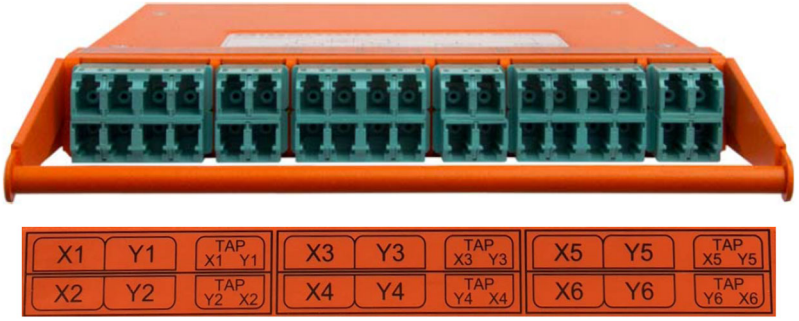

Figure 3-5: G-TAP M Series Module with Nomenclature for Six TAPs and LC Connectors

Figure 3-6 illustrates the suggested categories to create a cabling plan.

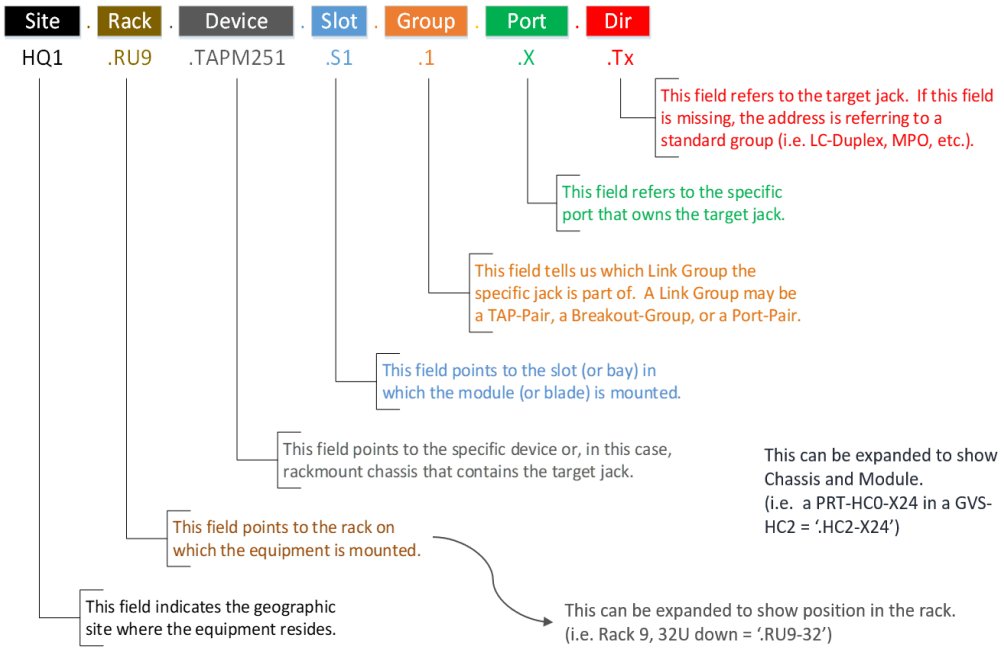

Figure 3-6: Suggested Categories for the Cabling Plan

Figure 3-7 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 3-7: 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 3-8. 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.

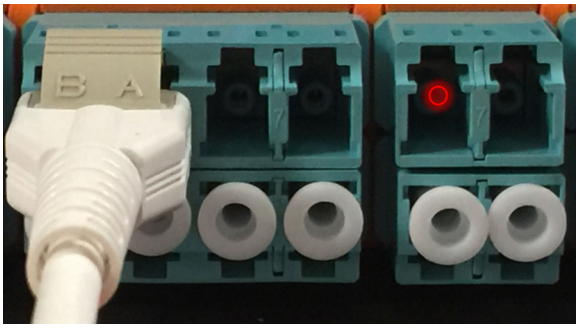

Figure 3-8: Red Light Passing to the First LC Connector

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 3-9.

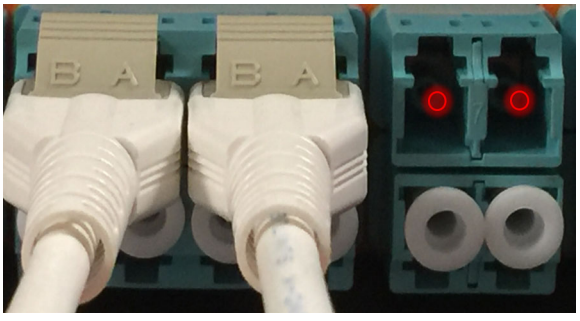

Figure 3-9: Red Light Passing to the First and Second LC Connectors

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* on page 7.

   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 3-10, Figure 3-11, and Figure 3-12.

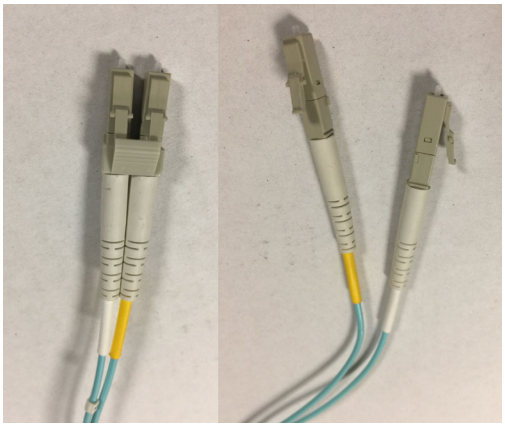

Figure 3-10: LC Connectors

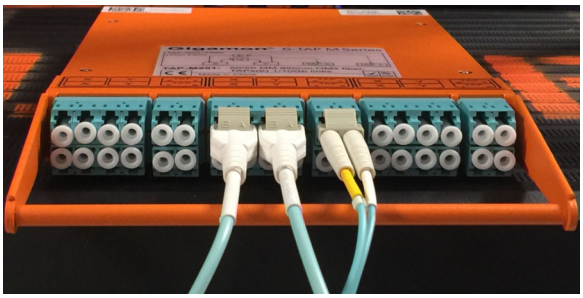

Figure 3-11: LC Connectors connected to TAP

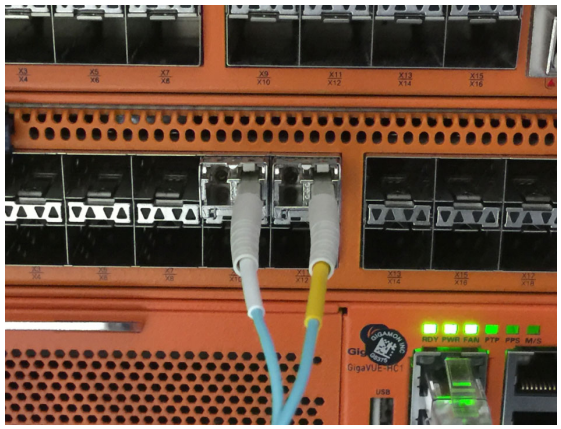

Figure 3-12: LC Connectors connected to GigaVUE Node

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 3-13 illustrates how to connect a PNL-M341 breakout panel to a BPS-HC3-C25F2G bypass combo module of GigaVUE-HC3.

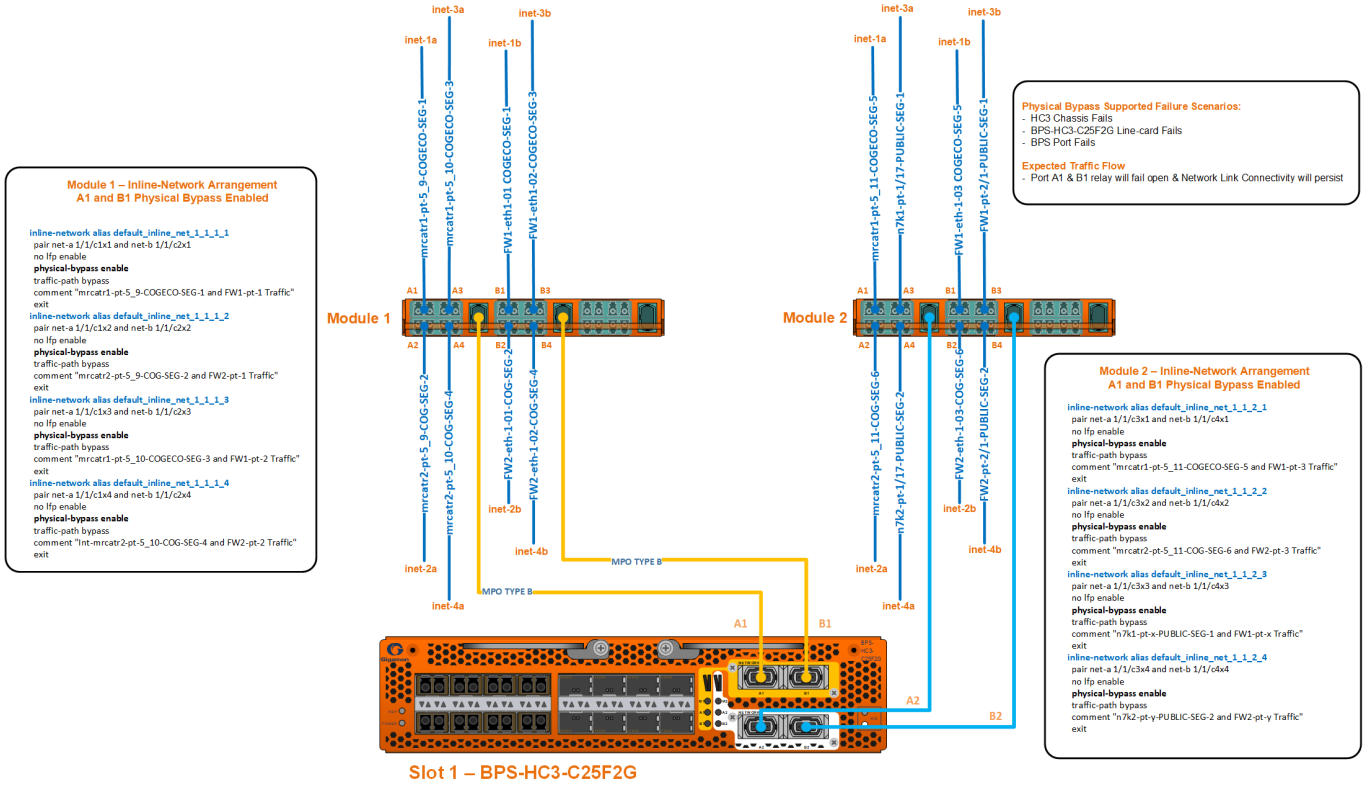

Figure 3-13: Connecting Breakout Panel to Inline Bypass Module

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.

A 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

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

Table A-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.

Table A-1: (Continued)Common Issues and Troubleshooting

Common Issues	Description	Troubleshooting Tips
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* on page 18.
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 A-1 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.

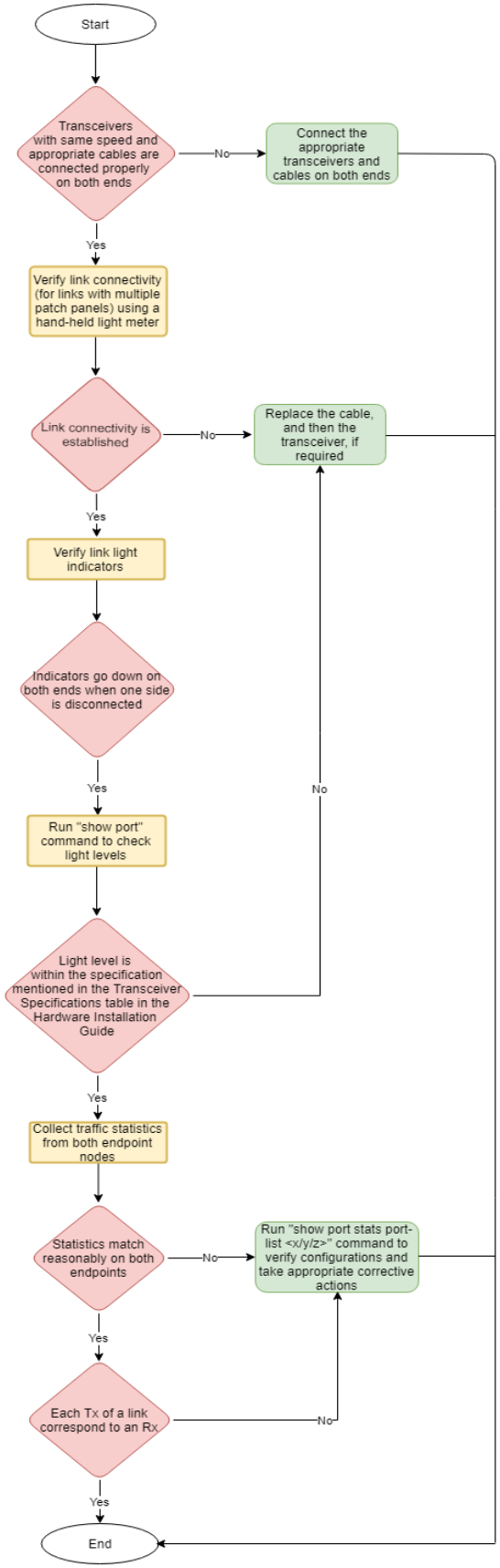

Figure A-1: Troubleshoot Generic TAP Issues

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.

B Additional Sources of Information

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

Documentation

Table B-1 lists the documents that are provided for the various Gigamon products. You can download the PDF versions of these documents from the Gigamon Customer Portal.

Table B-1: Documentation Suite for Gigamon Products

Document	Summary
Hardware Installation Guides	
GigaVUE-HC1 Hardware Installation Guide	Describes how to unpack, assemble, rack-mount, connect, and perform the initial configuration of the various GigaVUE nodes. Also provides reference information for the respective GigaVUE nodes, including specifications.
GigaVUE-HC2 Hardware Installation Guide	
GigaVUE-HC3 Hardware Installation Guide	
GigaVUE TA Series Hardware Installation Guide	
GigaVUE-OS Installation Guide on a White Box	Describes how to install the GigaVUE-OS on a white box.
Software Installation and Upgrade Guides	
GigaVUE-FM Installation and Upgrade Guide	Provides instructions for installing GigaVUE-FM on VMware ESXi, MS Hyper-V, and KVM. Also, provides instructions to upgrade GigaVUE-FM.
GigaVUE-OS Upgrade Guide	Describes how to upgrade a GigaVUE H Series node or a GigaVUE TA Series node to the latest GigaVUE-OS.

Document	Summary
Administration Guide	
GigaVUE-OS and GigaVUE-FM Administration Guide	Describes how to use the GigaVUE-FM interface to administer the GigaVUE H Series and GigaVUE TA Series software.
Configuration and Monitoring Guides	
GigaVUE-FM User's Guide	Provides instructions for installing, deploying, and operating the GigaVUE® Fabric Manager (GigaVUE-FM).
GigaVUE Cloud Suite for VMware Configuration Guide	Provides instructions for installing, deploying, and operating the GigaVUE® Virtual Machine (GigaVUE-VM).
GigaVUE Cloud Suite for AWS Configuration Guide	Provides instructions on configuring the GigaVUE Cloud components and setting up traffic monitoring sessions for the respective Cloud platform.
GigaVUE Cloud Suite for Azure Configuration Guide	
GigaVUE Cloud Suite for OpenStack Configuration Guide	
GigaVUE Cloud Suite for Kubernetes Container Configuration Guide	
GigaVUE Cloud Suite for AnyCloud Configuration Guide	Describes how to deploy the GigaVUE Cloud solution in any of the cloud platforms available in the market.
Reference Guides	
GigaVUE-OS CLI Reference Guide	Describes how to use the CLI (Command Line Interface) to configure and operate the GigaVUE H Series and TA Series software.
GigaVUE-OS Cabling Quick Reference 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.
GigaVUE-OS Compatibility and Interoperability Matrix	Provides information about the compatibility and interoperability requirements for the Gigamon devices.
REST API Getting Started Guide	Introduction to the Application Program Interfaces (APIs) for GigaVUE-FM and provides an overview of these REST APIs, basic work flows, and use cases. The APIs are implemented with the Representational State Transfer (REST) architecture. (Deprecation announcement: This has not been updated since 5.4. The content will be merged into the GigaVUE-FM User's Guide in a subsequent release.)
Release Notes	
GigaVUE-OS, GigaVUE-FM, GigaVUE-VM, and GigaVUE Cloud Suite Release Notes	Summarizes new features, resolved issues, and known issues in this release for GigaVUE-OS, GigaVUE-FM, and GigaVUE Cloud Suite. Also provides important notes regarding installing and upgrading to this release.

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

Contacting Technical Support

Refer to http://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.

Contacting Sales

Table i shows how to reach the Sales Department at Gigamon.

Table i: Sales Contact Information

Telephone	+1 408.831.4025
Sales	inside.sales@gigamon.com

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