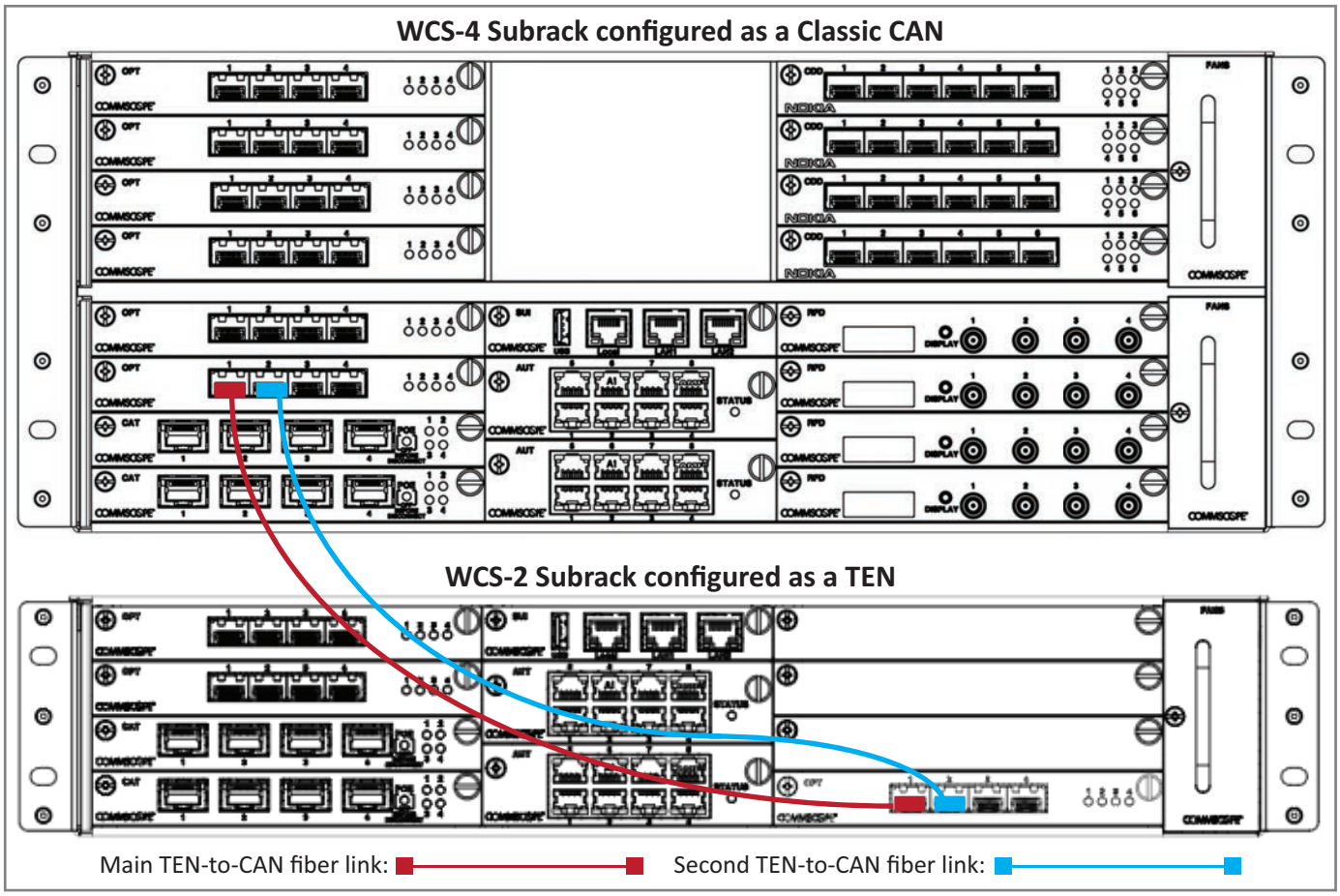
6 (Optional). To add an additional 320 MHz of RF between the TEN and CAN, do the following:

a Obtain a pair of SFP+ Modules that correspond to the length and type of fiber you will use to connect the CAN to the TEN. Note the maximum range listed in Table 13 on page 63.

b Follow local practice or manufacturer recommendations to clean fiber connectors.

c Connect one end of the cable with an SFP+ Module into one of the four ports on the OPT Card (labeled **1** - **4**) installed in the CAN.

d Connect the other end of the cable with an SFP+ Module into **Port 2** on the OPT Card installed in **Slot R1** of the TEN.



7 (Optional). To add additional TEN-to-CAN links, with each link adding an additional 320 MHz of RF capacity between the TEN and CAN, follow the process in Step 6, as needed for each additional link. However, you will now use Ports R1.2 through R1.4, which must be populated consecutively—there cannot be unused ports between used ports. That is, you cannot use Port R1.2 and R1.4 and leave R1.3 unused.

In addition to the card placement, you must also configure the function of the WCS Subracks in the ERA GUI. For further information, refer to the ERA configuration guide for Software Version 2.5 or later; see "Accessing ERA Series User Documentation" on page 85.

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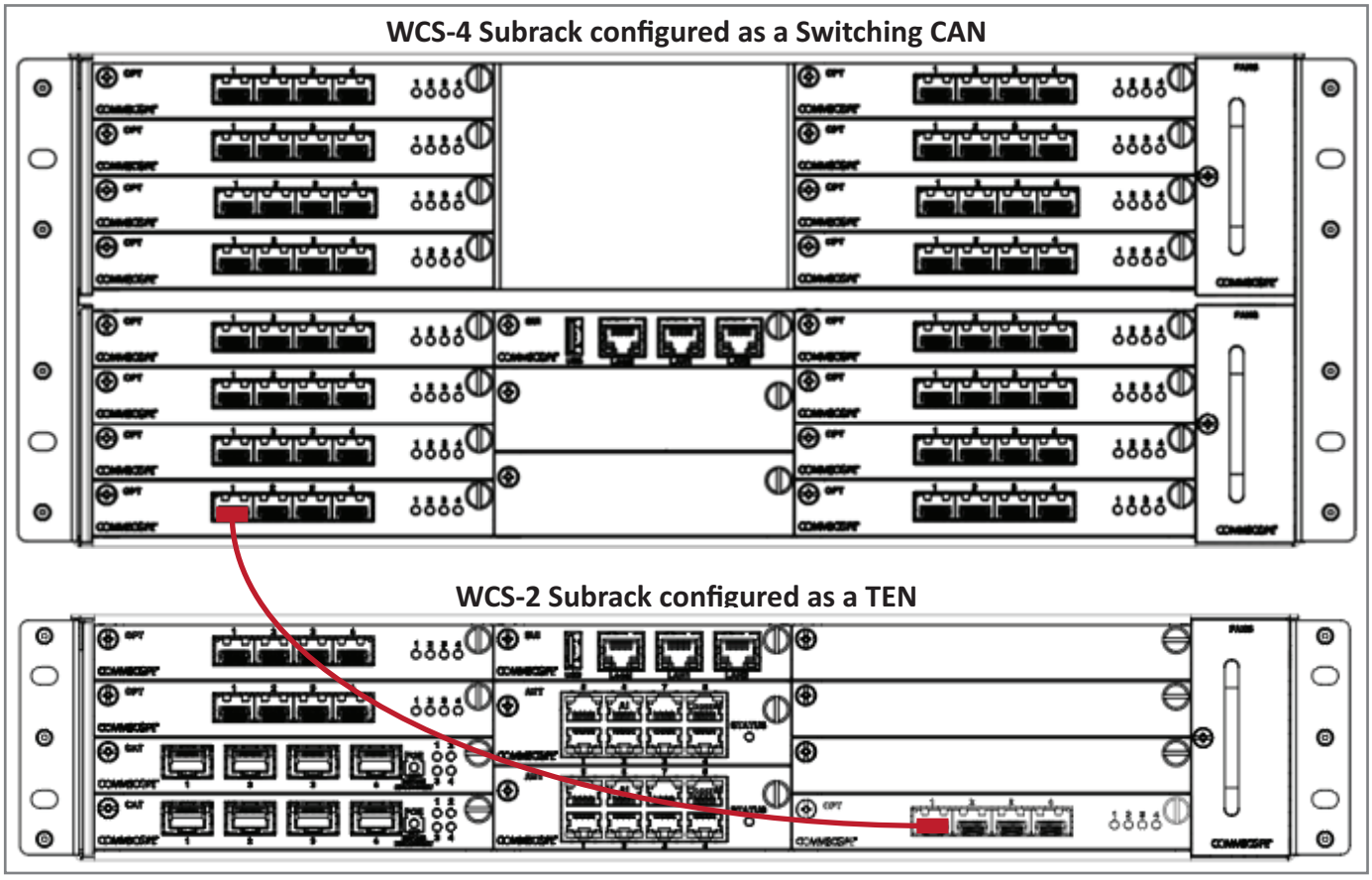
Cabling OPT Cards to Connect a TEN to a Switching CAN

In this process you will connect SFP+ Modules to the fiber cable and then use the cable to connect a TEN to a Switching CAN.

The graphics used in this process show a WCS-4 Subrack as a Switching CAN, and a WCS-2 Subrack as a TEN. The same rules for slots and port connections apply if the Switching CAN was a WCS-2 Subrack or the TEN was a WCS-4 Subrack.

1. Complete the steps in "SFP+ Modules Tested for use with ERA" on page 64.
2. Obtain a pair of SFP+ Modules that correspond to the length and type of fiber you will use to connect the CAN to the TEN or the WIN. Note the maximum range listed in Table 13 on page 63.
3. Follow local practice or manufacturer recommendations to clean fiber connectors.
4. Connect one end of the cable with an SFP+ Module into one of the OPT Card ports (labeled **1** - **4**) installed in the Switching CAN—you can only use Slots **L1** - **L8** in the Switching CAN.
5. Connect the other end of the cable with an SFP+ Module into an OPT Card in the TEN, as follows:
   - Use Port R1.1 to connect to the Switching CAN.
   - Use Ports R1.2 through R1.4 for additional TEN-to-CAN links.



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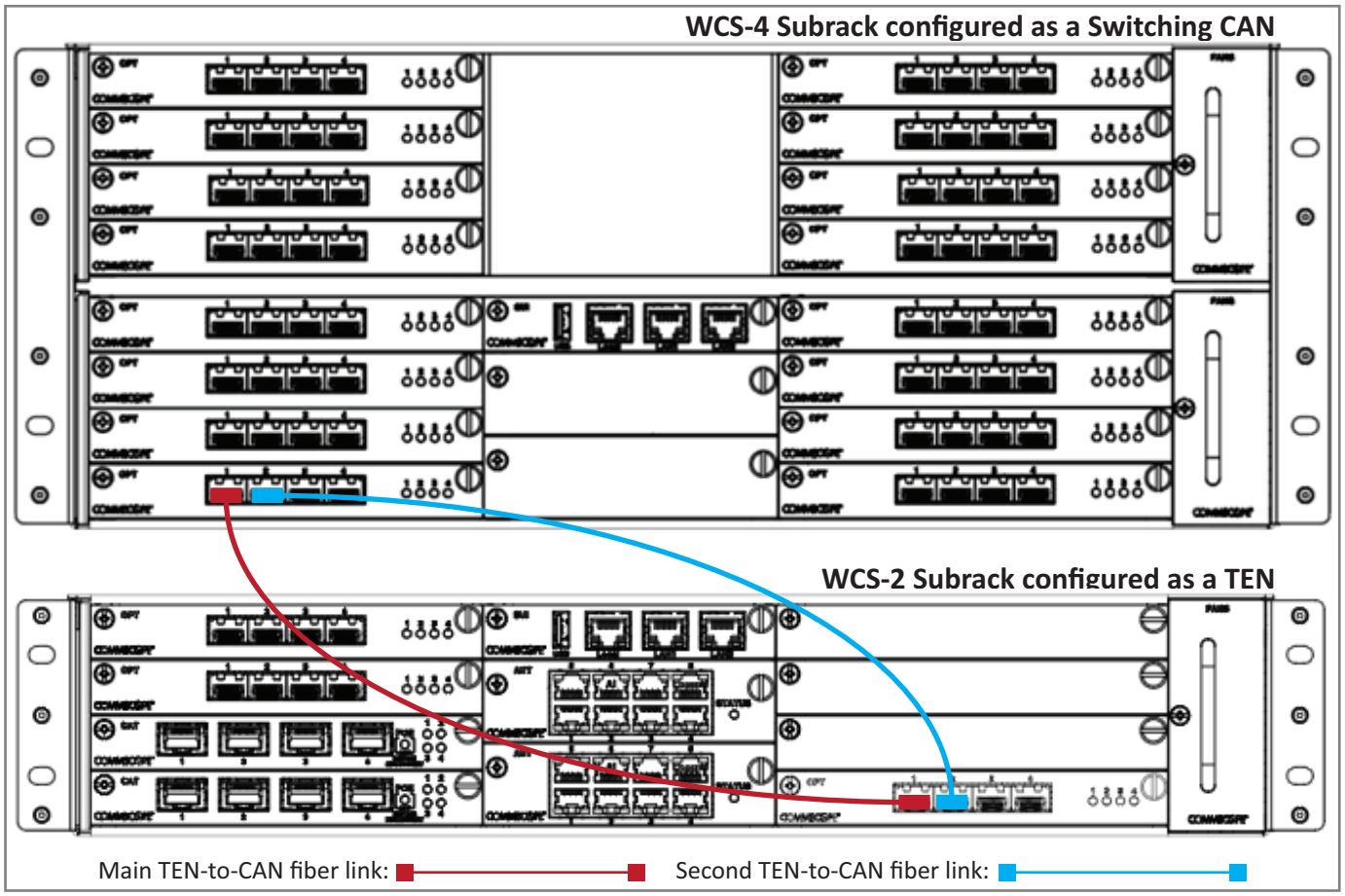
6 (Optional). To add an additional 320 MHz of RF between the TEN and the Switching CAN, do the following:

a Obtain a pair of SFP+ Modules that correspond to the length and type of fiber you will use to connect the CAN to the TEN. Note the maximum range listed in Table 13 on page 63.

b Follow local practice or manufacturer recommendations to clean fiber connectors.

c Connect one end of the cable with an SFP+ Module into one of the four ports on the OPT Card (labeled **1 - 4**) installed in the Switching CAN.

d Connect the other end of the cable with an SFP+ Module into **Port 2** on the OPT Card installed in **Slot R1** of the TEN.



7 (Optional). To add additional TEN-to-CAN links, with each link adding an additional 320 MHz of RF capacity between the TEN and Switching CAN, follow the process in Step 6, as needed for each additional link. However, you will now use Ports **R1.2** through **R1.4**, which must be populated consecutively—there cannot be unused ports between used ports. That is, you cannot use Port **R1.2** and **R1.4** and leave **R1.3** unused.

In addition to the card placement, you must also configure the function of the WCS Subracks in the ERA GUI. For further information, refer to the ERA configuration guide for Software Version 2.5 or later; see "Accessing ERA Series User Documentation" on page 85.

Cabling OPT Cards for Connecting to a Fiber AP

This procedure tells you how to connect an OPT Card in a CAN or a TEN to a Fiber AP. For full installation instructions, refer to the applicable Fiber AP installation guide. See "Accessing ERA Series User Documentation" on page 85.

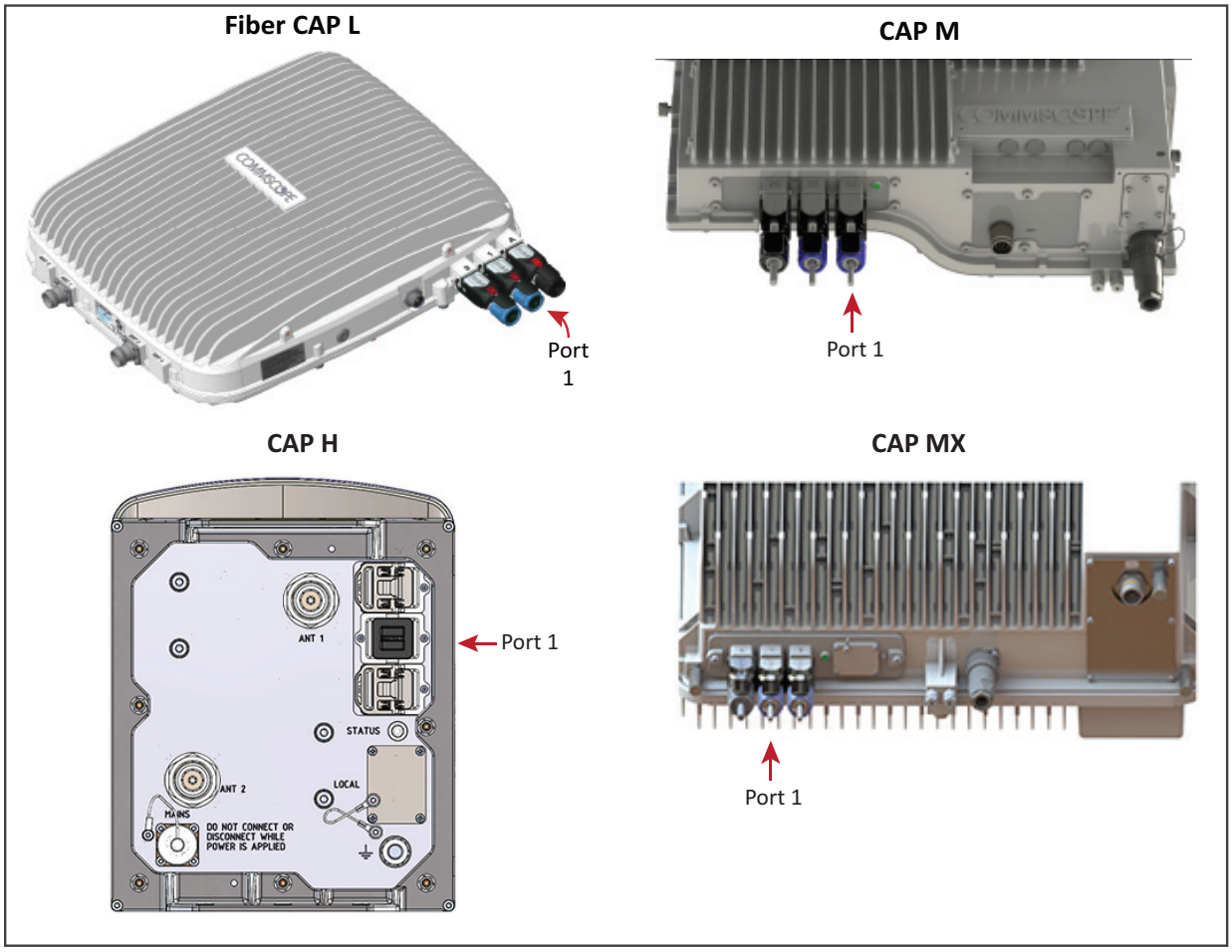
In this process you will connect SFP+ Modules to the fiber cable, and then use the cable to connect a CAN or a TEN to a Fiber AP.

1 Contact your local CommScope sales representative to obtain the following components, as required, for this installation.

- Per the installation plan, obtain either SMF or MMF that is of sufficient length to reach from the Fiber AP to the CAN or TEN.
- Obtain a pair of SFP+ Modules that is appropriate for this installation. Table 14 on page 64 identifies the available SFP+ Modules.
- The AP includes one Optical OCTIS Kit (PN 7770612). Obtain an additional kit to cascade APs.

2 Connect the Optical Port 1 on the Fiber AP, as appropriate for this installation.

a Remove the dust cap from Optical Port 1 on the Fiber AP, and from the connectors on the SMF or MMF (see graphic that follows).



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b Follow the local cleaning technique to clean Optical Port 1 on the Fiber AP.

c Clean the connectors on the SMF or MMF following the fiber supplier's recommendations.

d Install the SFP+ Module and Optical OCTIS Kit on the end of the SMF or MMF that will connect to the Fiber AP, and then connect it to Optical Port 1 on the Fiber AP (see the preceding graphic). Refer to the technical data sheet that ships with the OCTIS Kit for further information.

e Connect the other end of the fiber and SFP+ module to an open port on an OPT Card. (The OPT Card should only be installed in L1, L2, L3, or L4.)

If installing a CAP L with the CAP L Hybrid Fiber Splice Box Kit (PN 7774354-xx), the optical fiber will be hanging from the Hybrid Fiber Splice Box.

3 Complete the steps in "SFP+ Modules Tested for use with ERA" on page 64.

Connect the CAT Cards

This procedure tells you how to connect an AP to a CAT Card installed in a Classic CAN or a TEN. Card Cards cannot be used in a Switching CAN or WIN. In a cascaded AP configuration, you connect the CAT Card to the Main AP.

CAT Cards are hot swappable; you do not need to power down the CAN or TEN to install or remove an CAT Card.

The -48 Vdc WCS subracks do not supply power over CAT6A to UAPs or Copper CAP L APs.

The CAT2 Card is only compatible with UAP/CAP-L 2.0 Access Points.

1 Follow the steps in one of the following sections to install the CAT Cards in Slots L1 - L4 of a Classic CAN or a TEN, as needed for this installation:

- "Slot and Card Assignment Rules for Classic CANs" on page 18
- "Slot and Card Assignment Rules for TENs" on page 21.

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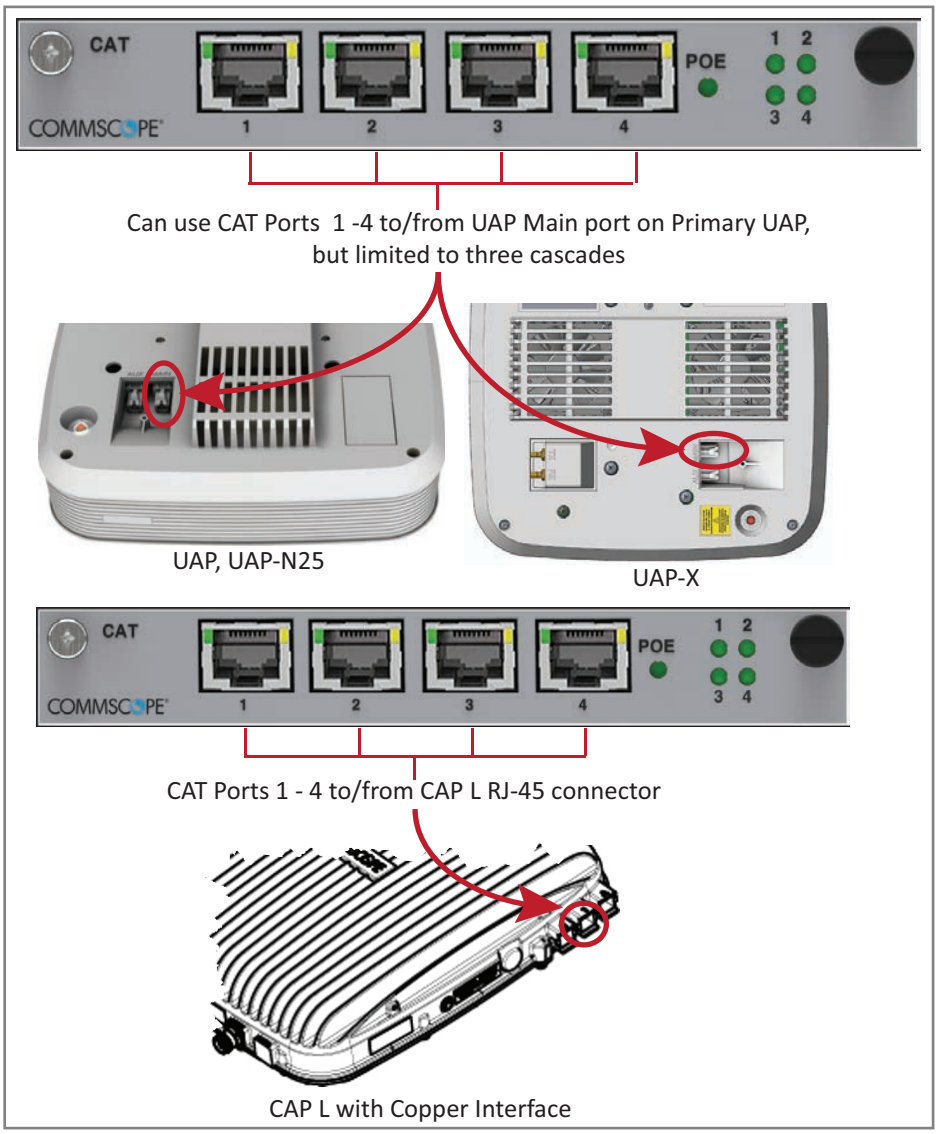
2 Use 23 AWG (minimum) Cat6A cables to connect up to four APs to the CAT Card as described below and as shown in the graphic below. When making this connection, observe the cabling rules identified in "Cat6A Cables and Connectors" on page 33.

- UAP, UAP-N25, UAP-X, and UAP-XN25—connect the CAT Card port to the UAP Main port.
- Copper CAP L—connect the CAT Card port to the CAP L RJ-45 port.



3 Use a testing device that provides an integrated test for Cat6A to make sure the Cat6A connections meet the requirements listed in "Cat6A Cables and Connectors" on page 33.

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Connect the AUT Cards

The following rules apply to the AUT Card ports 1 - 8.

- The outside network that supports the Ethernet device connected to the AP must be connected to the corresponding AUT Card and port of the Subrack containing the CAT/OPT card to which the AP is connected.
- Because the path from the AP AUX port to an AUT port path is a pass-through connection, no extra network setup procedures for the Ethernet device are required.
- The AUT path is independent of the signal set assigned to an AP, however, the maximum transport bandwidth for the AP is reduced from 320 MHz to 285 MHz when an Ethernet device is connected to the AP.
- An Ethernet device such as a camera can be connected to the AUX port of an AP if AUT Cards are installed in the TEN or CAN.
- The AUX port of a cascaded (secondary) AP cannot be used to connect an Ethernet device.
- The AUT Card ports do not supply power, however, the AP does supply Remote Power over Cat6A to connected Ethernet devices.
- 1 Gbps and 100 Mbps Ethernet devices are supported, however, the type of device supported is dependent on the type of device connected to the AUT port.
  - If a 100 Mbit/s Ethernet device is connected to the AUT port, then the Ethernet device connected to the associated AP must also be a 100 Mbit/s device.
  - If a 1 Gbit/s Ethernet device is connected to the AUT port, then either a 100 Mbit/s device or a 1 Gbit/s device may be connected to the associated AP.

AUT Cards are hot swappable; you do not need to power down the CAN or TEN to install an AUT Card.

An AP will experience a Loss of Service that lasts approximately 1.5 minutes when a cascaded AP or an Ethernet device is connected to its AUX port. APs re-flash and reboot whenever an Ethernet device is initially added or when the type of device (AP or Ethernet device) connected to the AUX port is changed. The blue LED on the AP blinks while the AP is re-flashing without interrupting service, but during the reboot the AP experiences approximately 1.5 minutes of Loss of Service.

An AUT Card cannot be used in a Switching CAN or a WIN.

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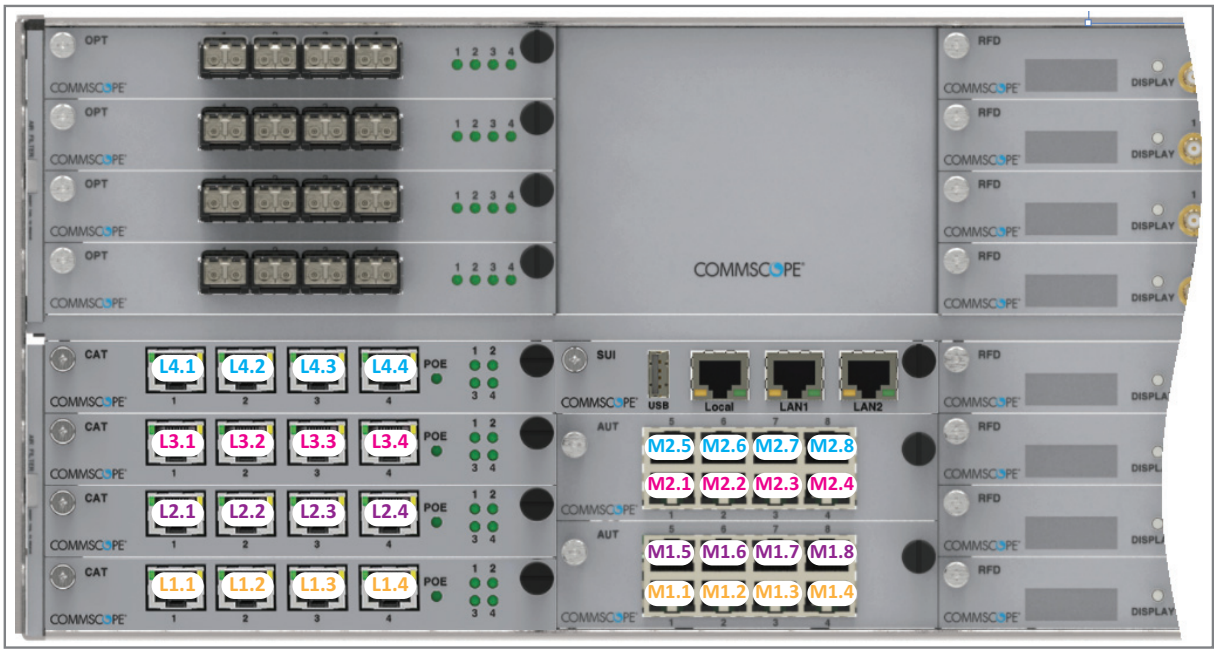
Figure 13 shows the internal mapping between WCS slots and CAT/OPT Card ports to AUT Card slots and ports. There is a specific relationship between the slot in which the CAT and AUT Cards are installed, and the CAT and AUT Card ports. For example:

- The CAT/OPT Card slot/port combination of **L1.1** always maps to AUT Card slot/port combination **M1.1**
- The CAT/OPT Card slot/port combination **L4.4** always maps to AUT Card slot/port combination **M2.8**.

This internal mapping provides the Ethernet backhaul for Ethernet devices connected to the Ethernet ports on the AUT Card.

Figure 13 shows the CAT Card installed in Slots L1 - L4. The mapping shown would be the same for an OPT Card installed in Slots L1 - L4.



WCS Slot (L1 - L4)	CAT/OPT Card Port	AUT Card Slot (M1 - M2)	AUT Card Port
L1	1	M1	1
L1	2	M1	2
L1	3	M1	3
L1	4	M1	4
L2	1	M1	5
L2	2	M1	6
L2	3	M1	7
L2	4	M1	8

WCS Slot (L1 - L4)	CAT/OPT Card Port	AUT Card Slot (M1 - M2)	AUT Card Port
L3	1	M2	1
L3	2	M2	2
L3	3	M2	3
L3	4	M2	4
L4	1	M2	5
L4	2	M2	6
L4	3	M2	7
L4	4	M2	8

Figure 13. Internal Mapping of CAT/OPT Card Slots and Ports to AUT Card Slots and Ports

Use the preceding information and the following steps to connect the AUT Card(s) to the ERA system.

1 Follow the steps in "Install and Connect the Subrack Cards" on page 58 to install the AUT Card(s) into the WCS Subrack Slots M1 - M2, as needed for this CAT/TEN installation.

2 Use to Figure 13 as a reference for port assignments of auxiliary devices subtended off an AP.

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Connect the CDD Cards

The following sections guide you through the installation of a CDD Card. Adhere to all product safety and compliance cautions and follow the steps in the order presented.

Calculate the Power Draw

The maximum power draw for a CDD Card is 40 Watts. To determine the power draw of all CDD Cards installed in the CAN, multiply the number of CDD Cards installed by 40 Watts.

This calculation is for the CDD Card only.

Connect the CDD Card to the BBU

CDDs are hot swappable; you do not need to power down the CAN or WIN to install or remove a CDD.

1. If necessary, contact your local Nokia sales representative to obtain the required number of SFP Modules for this installation. The CPRI line rate is determined by each installation; care must be taken to order the proper speed grade SFP Module based on the installation requirements.

Do not use CommScope ERA SFP+ Modules in the CDD Card.

2. Slide an SFP Module into a CDD Card CPRI Port (labeled 1 - 6), and then push the SFP Module into the CDD Card until you hear it click into place.

Should you need to remove an SFP Module, do the following in the order presented to prevent damage to the SFP Module, the CDD Card, or the fiber.

1. Disconnect the fiber cable.

2. Pull down on the extraction lever on the SFP Module.

3. Use the extraction lever to carefully pull the SFP module out of the CDD Card slot.

3. Obtain the required length of Single-Mode Fiber cable (with loss of less than 13 dB) that has a dual-fiber LC jumper that can reach from a CDD Card CPRI port in the Classic CAN or WIN to a CPRI port on the Nokia AirScale FSM4 ABIA Module in the BBU.
4. Connect one end of the cable to an SFP Module installed in a CDD Card CPRI Port (labeled 1 - 6).
5. Connect the other end of the cable to a CPRI port on the Nokia AirScale ABIA Module, where the CPRI ports are labeled RF-*n* where *n* is the port number (1 - 6).

   Refer to the following graphics for examples of BBU to CDD Card connectivity:

   - For Classic CAN installations, see Figure 14 on page 78
   - For WIN installations, see Figure 15 on page 79.

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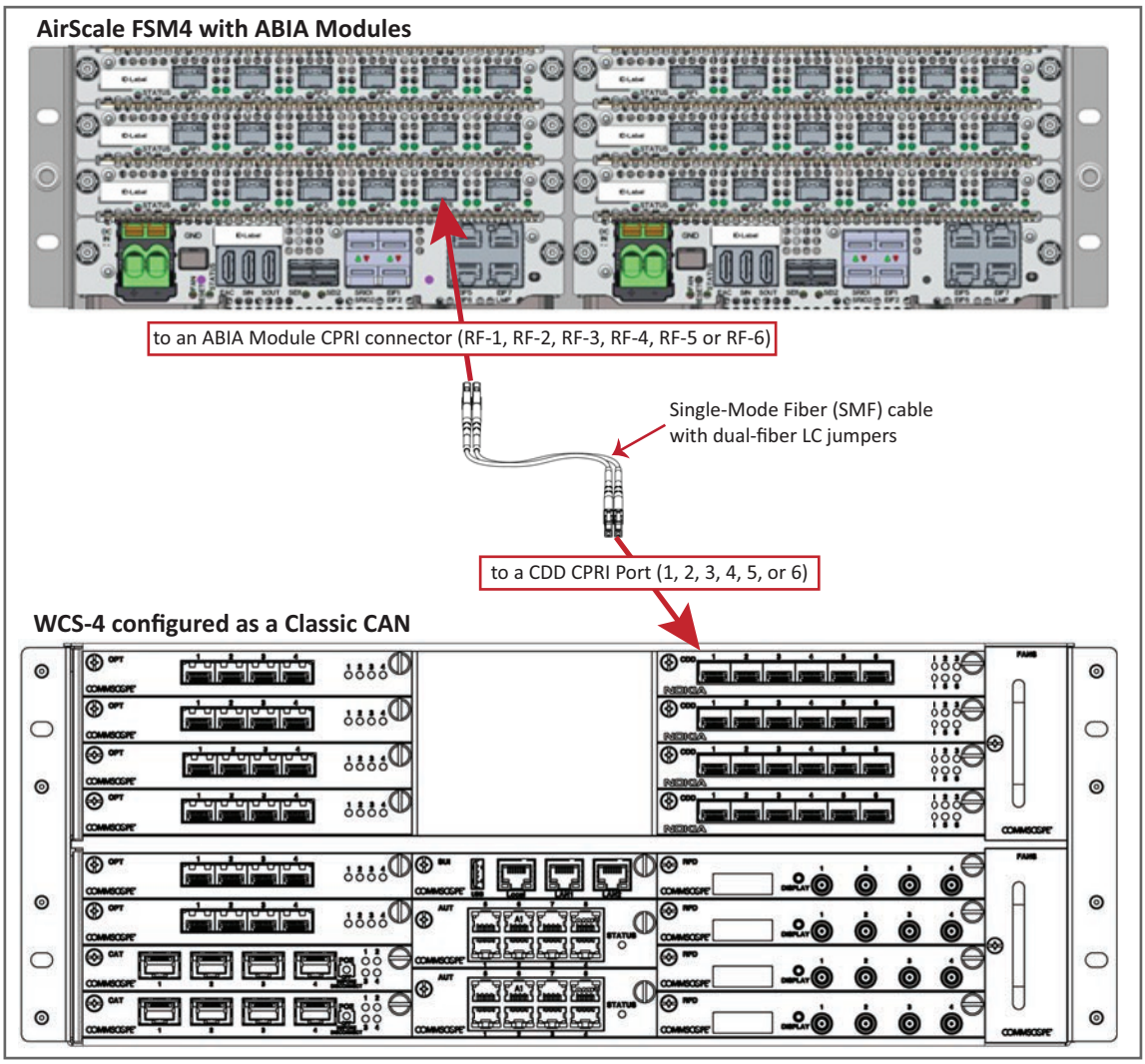

Figure 14. CDD Card in a Classic CAN Connecting to a BBU

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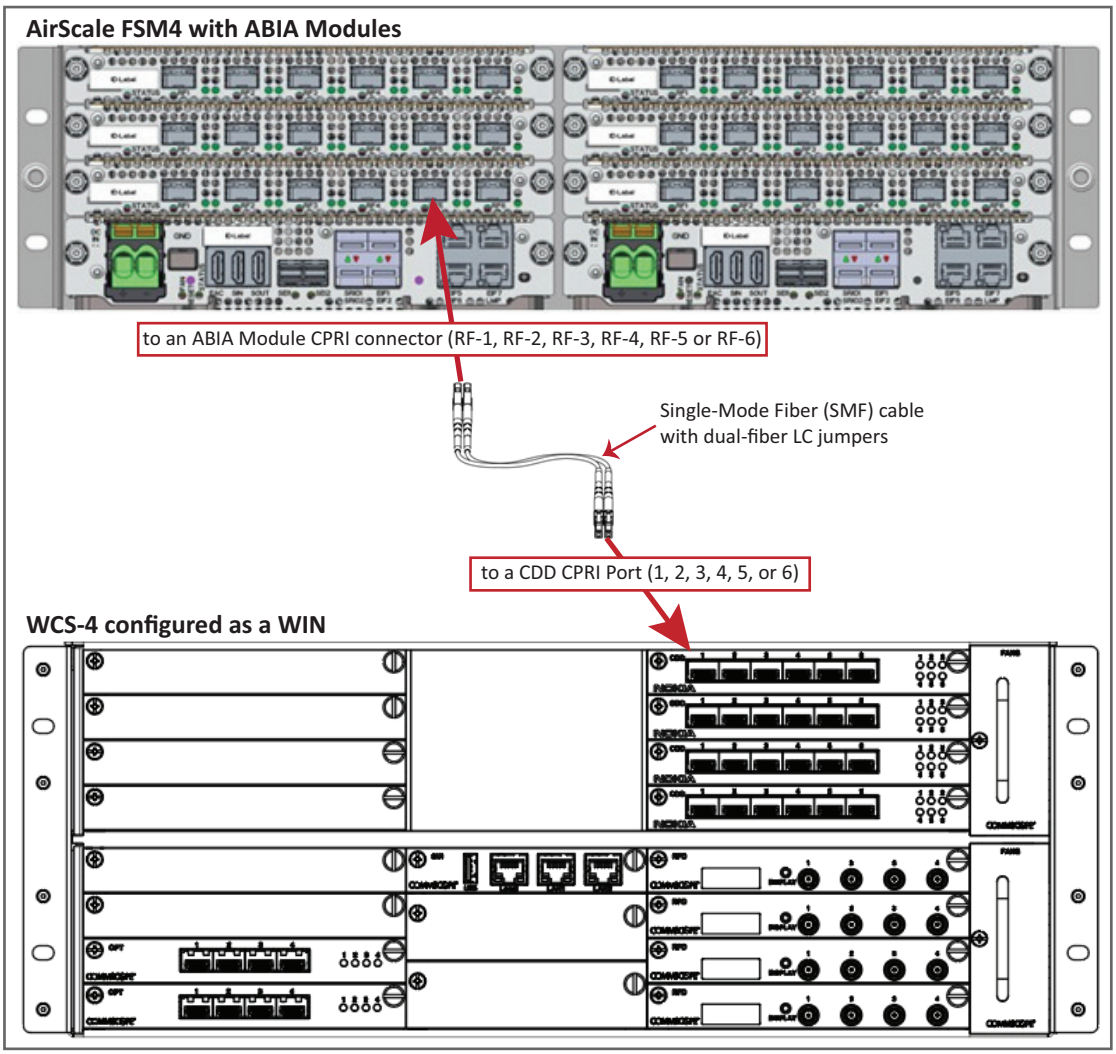

Figure 15. CDD Card in a WIN Connecting to a BBU

MAINTENANCE

The following sections provide maintenance information.

WCS Subrack Filter Module Maintenance

The WCS-2 Subrack has one Filter Module, and the WCS-4 Subrack has two Filter Modules on the left-hand side of the chassis (see "WCS Subrack Fan Trays and Filter Modules" on page 32). Air enters the Subrack on the left side of the chassis and exits on the right by the Fan Tray.

The Filter Modules should be checked every six months to make sure they are clear of dust and cleaned if necessary. A dirty Filter Module will inhibit fresh air flow and can cause temperature alarms. CommScope has found that CAT Cards are typically first to show temperature alarms if the Filter Module becomes clogged.

Removing a WCS Subrack Filter Module

WCS Subrack Filter Modules can be pulled out with your fingers, as there are no screws—Filter Modules are retained in the WCS Subrack chassis by friction. However, you may have to use a screwdriver or a flat blade under the lip of the Filter Module frame to help pry it out of its slot. Filter Modules can be pulled out while the system is running.

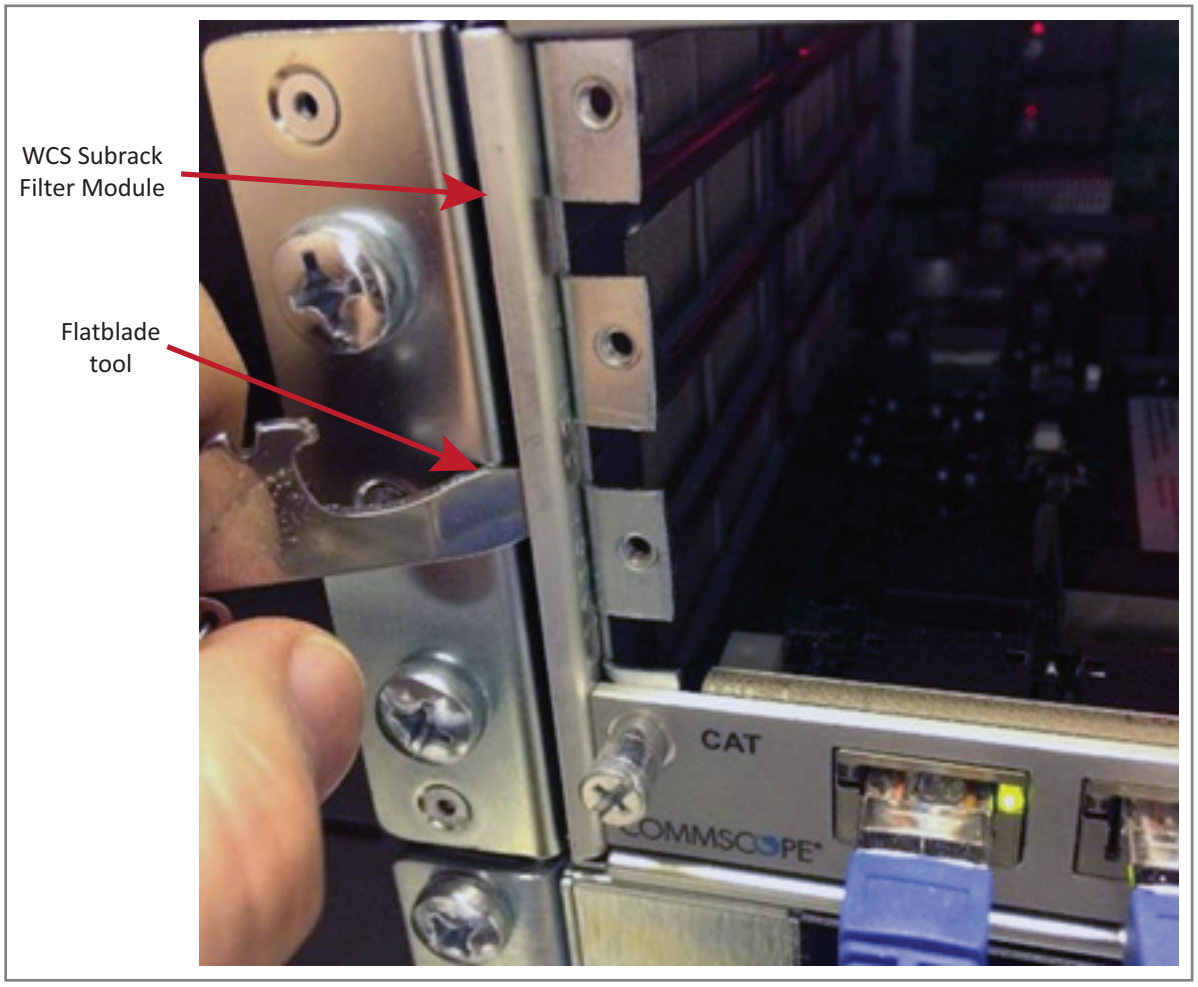

Figure 16. Removing a WCS Filter Module

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Cleaning a WCS Subrack Filter Module

The Filter Modules are reusable, and can be cleaned with a brush, vacuum, or water. If water is used, as much dust as possible should be removed before getting the Filter Module wet. Figure 17 shows examples of a clean and a dirty Filter Module.

When cleaning a Filter Module, take care so you do not damage the EMI gasket at the front of the filter frame. If the Filter Module becomes damaged and cannot be reinstalled, contact your local CommScope sales representative to order a new Filter Module (PN 7700691-xx).

Do not clean the Filter Module with water in the same vicinity as the WCS Subrack or other electronics. Wet conditions increase the potential for receiving an electrical shock when installing or using electrically powered equipment. Make sure the Filter Module is completely dry before replacing it in the WCS Subrack chassis.

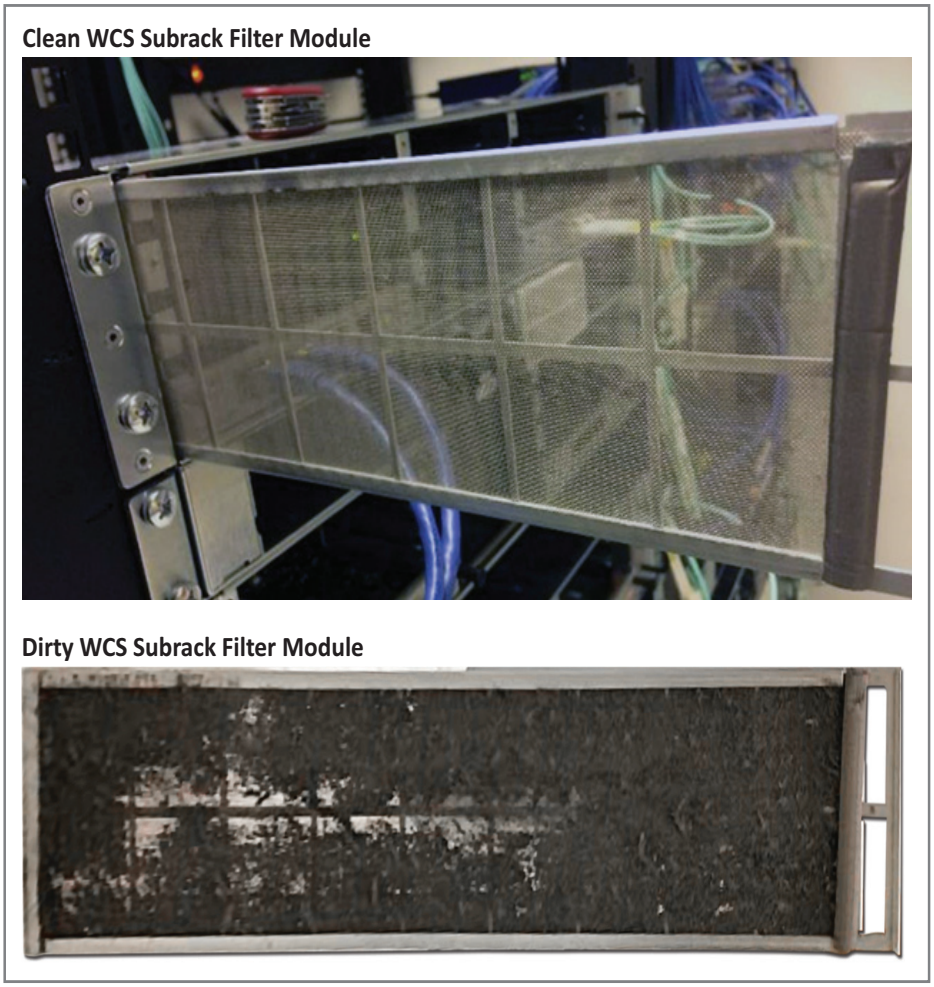


Figure 17. Examples of Clean and Dirty WCS Subrack Filter Modules

Installing a WCS Subrack Filter Module

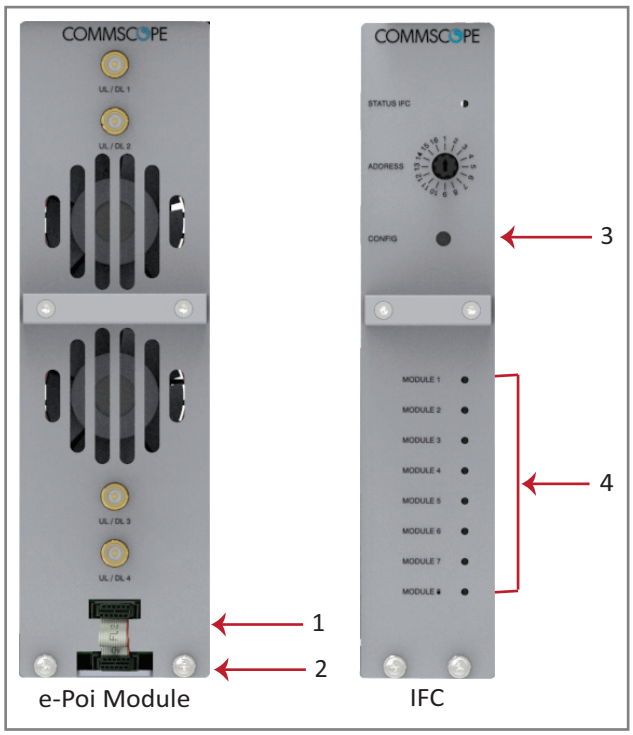
To install a cleaned or new Filter Module, slide the filter into its slot and press firmly until its edge is aligned with the front faceplate of the WCS Subrack chassis and cannot be pushed in any further.

Removing an e-POI Module from an e-POI Subrack

e-POI modules are hot swappable; you do not need to power down the e-POI subrack to add or remove an e-POI module, but you should follow the instructions below to ensure that false alarms are not generated due to a missing e-POI module.

The ERA Software automatically detects when an e-POI Module is added to an e-POI Subrack. Should you need to remove an e-POI Module, you must do the following:

1. Disconnect the Ribbon cable from the e-POI Module that you are removing from the e-POI Subrack.
2. Loosen the two thumbscrews on the bottom of the e-POI Module and pull it from the Subrack.
3. Press the Config button on the IFC for 5 seconds. This tells the ERA Software to scan and delete the removed e-POI Module from inventory and clear any alarms related to that e-POI Module.
4. Wait for the e-POI Module Status LEDS on the IFC to flash off and then on, which indicates that the IFC has been reconfigured.



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Cat6A Specifications and Testing Requirements

Cat6A connections must be tested with a device that can measure the cable parameters against the thresholds defined in ANSI/TIA standards (such as the Fluke DTX-1800 and DSX-5000). Figure 18 shows the end-to-end channel from the CAN/TEN to the CAP L, which is inclusive of the Cat6A cable, the Cat6A Patch Cord, and the Panel and connection box. The end-to-end channel must meet the Cat6A U/UTP performance defined by the TIA/EIA 568 C.2 standard; see Table 15.

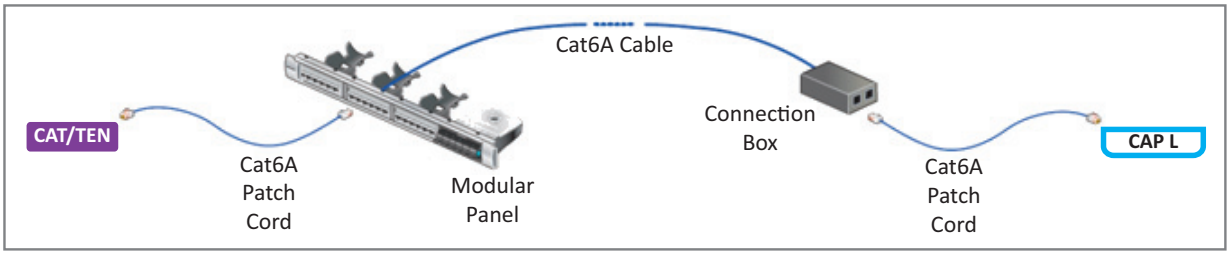

Figure 18. ERA End-to-End Channel

Some cables list their performance in "typical" performance values. However, sweep-testing is necessary to confirm actual performance. CommScope strongly recommends using Cat6A cable that has been tested to the listed frequency with test confirmation available for inspection.

Table 15. *Cat6A U/UTP Performance Standards (TIA/EIA 568 C.2)*

MHz	Insertion Loss (dB) Channel/Link	NEXT (dB) Channel/Link	PSum NEXT (dB) Channel/Link	ACRF (dB) Channel/Link	PSum ACRF (dB) Channel/Link	Return Loss (dB) Channel/Link
1	2.3/1.9	65.0/65.0	62.0/62.0	63.3/64.2	60.3/61.2	19.0/19.1
4	4.2/3.5	63.0/64.1	60.5/61.8	51.2/52.1	48.2/49.1	19.0/21.0
8	5.8/5.0	58.2/59.4	55.6/57.0	45.2/46.1	42.2/43.1	19.0/21.0
10	6.5/5.5	56.6/57.8	54.0/55.5	43.3/44.2	40.3/41.2	19.0/21.0
16	8.2/7.0	53.2/54.6	50.6/52.2	39.2/40.1	36.2/37.1	18.0/20.0
20	9.2/7.8	51.6/53.1	49.0/50.7	37.2/38.2	34.2/35.2	17.5/19.5
25	10.2/8.8	50.0/51.5	47.3/49.1	35.3/36.2	32.3/33.2	17.0/19.0
31.25	11.5/9.8	48.4/50.0	45.7/47.5	33.4/34.3	30.4/31.3	16.5/18.5
62.5	16.4/14.1	43.4/45.1	40.6/42.7	27.3/28.3	24.3/25.3	14.0/16.0
100	20.9/18.0	39.9/41.8	37.1/39.3	23.3/24.2	20.3/21.2	12.0/14.0
200	30.1/26.1	34.8/36.9	31.9/34.3	17.2/18.2	14.2/15.2	9.0/11.0
250	33.9/29.5	33.1/35.3	30.2/32.7	15.3/16.2	12.3/13.2	8.0/10.0
300	37.4/32.7	31.7/34.0	28.8/31.4	13.7/14.6	10.7/11.6	7.2/9.2
400	43.7/38.5	28.7/29.9	25.8/27.1	11.2/12.1	8.2/9.1	6.0/8.0
500	49.3/43.8	26.1/26.7	23.2/23.8	9.3/10.2	6.3/7.2	6.0/8.0

Propagation Delay is 555 nanoseconds for channel/498 nanoseconds for link tested at 10 MHz.

Delay Skew is 50 nanoseconds for channel/44 nanoseconds for link tested at 10 MHz.

For additional information, see also *CommScope Product Specifications for the GigaSPEED X10D® 2091B ETL Verified Category 6A U/UTP Cable* (760107201 | 2091B BL 4/23 W1000). (Click here access the document online.)

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Contacting CommScope

The following sections tell you how to contact CommScope for additional information or for assistance.

CMS Global Technical Support

The following sections tell you how to contact the CommScope Mobility Solutions (CMS) Technical Support team. Support is available 7 days a week, 24 hours a day.

Telephone Helplines

Use the following Helpline telephone numbers to get live support, 24 hours a day:

24x7	+1 888-297-6433 (Toll free for U.S. and Canada)
EMEA 8:00-17:00 (UTC +1)	+ 800 73732837 (Toll free for parts of EMEA and Australia)
	+ 49 909969333 (Toll charge incurred)
	Calls to an EMEA Helpline outside of the 8:00 to 17:00 time frame will be forwarded to the 24x7 Helpline.

Online Support

1. To go to the CommScope **Wireless Support Request** web page from which you can initiate a Technical Support ticket, do one of the following:
   - Scan the QR Code to the right.
   - If viewing this document online as a PDF, click on the following URL link:

     http://www.commscope.com/wisupport
2. Follow the online prompts to initiate a Technical Support ticket.

Waste Electrical and Electronic Equipment Recycling

Country specific information about collection and recycling arrangements per the Waste Electrical and Electronic Equipment (WEEE) Directive and implementing regulations is available on CommScope's website.

To access information on the CommScope recycling program, do any of the following:

- Scan the QR Code to the right.
- If viewing this document online as a PDF, click on the following URL link:

  http://www.commscope.com/corporate-responsibility-and-sustainability/environment/weee-customer-recycling/
- Enter the preceding URL into your web browser, and then press **ENTER** on your keyboard.

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Hardware to Software Mapping Information

1. To view or download a document that lists the minimum software requirements for ERA hardware, do one of the following:
   - Scan the QR Code to the right.
   - If viewing this document online as a PDF, click on the following URL link:

     http://www.commscope.com/resources/in-building-wireless
2. Click on a document link to open it, or right click on the link and select the **Save target as...** option from the contextual menu.

Technical Training

1. To access the CommScope University Training site, please use the following web address or scan the QR code to the right:

   www.commscopeuniversity.com
2. Once you are logged in, you can search for training by typing search words in the search field or by going to the Course Catalog to view the available courses.
3. Instructor-led courses are conducted in North America and Europe. Before choosing a course, please verify the region.

For training related questions, please contact us:

Americas: DASTrainingUS@CommScope.com

EMEA: DASTrainingEMEA@CommScope.com

Accessing ERA Series User Documentation

1. To access ERA user documentation on the CommScope DCCS Customer Portal web page, do one of the following:
   - Scan the QR Code to the right to go directly to the CommScope DCCS Customer Portal, where you can access the ERA user documentation.
   - If viewing this document online as a PDF, click on the following URL link:

     https://www.commscope.com/membership
2. Access to the Customer Portal requires a user account and password. On the **Sign in** page, do one of the following:
   - If you have an account, enter your **Email** and **Password**, and then click **Sign In**.
   - If you don't have an account, in the **Register Today** panel, click **Register** and follow the prompts.
3. On the **My CommScope** page, click **DCCS**.
4. If prompted with **Please sign in to continue**, enter your **Email** and **Password**, and then click **Sign In**.
5. Under the **Site** list, select your site name.
6. In the **Welcome** page, click **ERA**.
7. Click on the title of any document to open it.

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