CommScope ERA®
WCS and e-POI Subracks and Power Supply Unit

Installation Guide • M0201ABH • November 2020

COMMSCOPE®

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ERA® and ION-E®

ERA is an extension of the hardware and software architecture that CommScope originally introduced as ION-E. Going forward, all new systems are ERA. Since ION-E and ERA share the same hardware modules, system software and management systems, existing ION-E systems can be updated and expanded using ERA components.

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Andrew Wireless Systems GmbH, November 3, 2020

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Document Overview

The information in this document guides you through the installation of CommScope ERA® components, which includes the ERA WCS-2, WCS-4, -48Vdc WCS-2, -48Vdc WCS-4, and e-POI Subracks and their cards or modules, and the Power Supply Subrack and its 12 Vdc and 57 Vdc Rectifier Modules. Table 1 identifies the ERA hardware that this installation guide supports.

Table 1. *ERA Hardware System Components Supported in this Manual*

Component		Description
WCS Subracks and Cards		
	WCS-4 Subrack	The WCS-4 Subrack is configured in the GUI as a Classic CAN, Switching CAN, WIN, or TEN. The WCS-4 (7635442-xx) is powered by the ERA AC to DC PSU subrack and power modules. The -48Vdc WCS-4 (7844068-xx) is powered by an external -48 Vdc power supply.
	WCS-2 Subrack	The WCS-2 Subrack is configured in the GUI as a Classic CAN, Switching CAN, WIN, or TEN. The WCS-2 (7635443-xx) is powered by the ERA AC to DC PSU subrack and power modules. The -48Vdc WCS-2 (7844067-xx) is powered by an external -48 Vdc power supply.
	Fan Module	The factory installed Fan Tray Modules cool a WCS Subrack and all of its cards.
See Figure 17 on page 78	Fan Filter	Air Filter Modules are installed in the left side of the WCS Subrack to prevent dust and other particulates from circulating into the WCS Subrack.
	System User Interface (SUI) Card	The SUI Card provides local and LAN Ethernet connections and a USB port.
	RF Donor (RFD) Card	The RFD Card is the interface for RF signals between the RF source (such as the BTS, eNodeB or e-POI) and a Classic CAN and WINs. Note that CAP M and CAP H APs require the use of RFD Card PN 7633229-01 or higher or a CDD card.
	Optical Transport (OPT) Card	The OPT Card provides a 10 Gbps fiber connection between a Switching CAN, TENs, and WINs; and between a Classic CAN and TENs and Fiber APs. Each OPT Card supports up to four SFP+ transceivers for device connections. New OPT Card 7642123-01 requires ERA V2.8.0 or higher software.
	Copper Transport (CAT) Card	The CAT Card provides 10 Gbps Cat6A connections between a Classic CAN and TENs and UAPs or Copper CAT Ls. CAT Cards also supply the remote power over Cat6A to the UAPs or Copper CAT Ls. At least one 57 Vdc Module is required to use a CAT Card.
	Auxiliary Unit Transport (AUT) Card	The AUT Card provides a 1 Gbps pass-through connection between a Classic CAN and TENs and APs for WiFi, IP cameras, or other Ethernet devices.
	CPRI Digital Donor (CDD) Card	The CDD Card provides a digital CPRI interface between a Nokia BBU and a Classic CAN or WIN.
Power Supply Unit and Power Modules		
	Power Supply Unit (PSU)	The PSU can house up to two 12 Vdc Power Modules and two 57 Vdc Power Modules, which supply power to WCS Subracks, APs, and connected devices.
	12 Vdc Power Module	A 120/240 Vac to 12 Vdc module plugs into the Power Supply Subrack to provide 12 Vdc power to WCS Subracks and e-POI Subracks.
	57 Vdc Power Module	A 120/240 Vac to 57 Vdc Module plugs into the Power Supply Subrack to provide remote power over Cat6A to connected APs and devices connected to the APs.
e-POI Subrack and Cards		
	e-POI Subrack	The e-POI Subrack supports up to eight e-POI RF Modules (RFMs) and one Interface Card (IFC); ships with the IFC factory-installed.
	Interface Card (IFC)	The IFC is used to set the Subrack number of the e-POI Subrack. It also provides a Status LED for each of the e-POI Modules in the Subrack. The IFC is factory installed in the e-POI Subrack.

Table 1. *ERA Hardware System Components Supported in this Manual (Continued)*

Component		Description
	e-POI Module	The e-POI Modules are low PIM attenuators that reduce high power RF signals from their source by 30 dB to interface with the RFD Cards and works with duplexed input signals.
Access Points		
	• UAP • UAP-N25	A Universal Access Point (UAP) connects to the ERA system via Cat6A cabling, uses its internal antennas to transmit and receive over-the-air signals. It also supports Ethernet backhaul or a cascaded UAP through its AUX port. Similar in function to the UAP and UAP-X, the UAP-N25 and UAP-XN25 feature a 25 MHz filter on one path (instead of the 80 MHz filter on a UAP or UAP-X). This allows coexistence of specific bands, such as Australia 850 MHz and 900 MHz.
	• UAP-X • UAP-XN25	
	CAP L	The Low Power Carrier Access Point (CAP L) connects via Cat6A, Single-Mode Fiber (SMF), or Multi-Mode Fiber (MMF), uses external antennas to transmit and receive over-the-air signals, and supports Gigabit Ethernet pass-through for WiFi, IP cameras, or other devices. The CAP L can provide up to 21 dBm of RF output power per band. It also supports one cascaded CAP L.
	CAP M	The Medium Power Carrier Access Point (CAP M) connects via Single-Mode Fiber (SMF) or Multi-Mode Fiber (MMF), uses external antennas to transmit and receive over-the-air signals, and supports pass-through for Ethernet devices (such as WiFi and IP cameras). The CAP M, dependent on the frequency band, can provide up to 30 dBm of RF output. It also supports one cascaded CAP M.
	CAP MX	The CAP MX connects via Single-Mode Fiber (SMF) or Multi-Mode Fiber (MMF) and uses external antennas to transmit and receive over-the-air signals. It supports a large number of licensed bands. The CAP MX, dependent on the frequency band, can provide from 29 dBm to 33 dBm of RF output. It also supports one cascaded CAP M.
	CAP H	The High Power Carrier Access Point (CAP H) connects via Single-Mode Fiber (SMF) or Multi-Mode Fiber (MMF) and uses external antennas to transmit and receive over-the-air signals. The current ERA software does not support pass-through for Ethernet devices (such as WiFi and IP cameras) for CAP H, but this will be supported in a future software update. The CAP H can provide up to 43 dBm of RF output per band. It also supports one cascaded CAP H.

Document Revision History

This is the seventh release of the *WCS-2, WCS-4, and e-POI Subracks and Power Supply Unit Installation Guide*, CommScope Document Number M0201ABH.

- adds -48Vdc WCS-2 (7844067-xx) and -48Vdc WCS-4 (7844068-xx) subracks. These WCS are powered by an external -48Vdc power supply and do not provide Power over CAT6A to UAPs or Copper CAP Ls. The rear panel connectors information and mounting requirements for these subracks is covered.
- Added new OPT Card, part number 7642123-01. CommScope R&D updated the optical card with new available subcomponents to prevent parts delays. This update does not change the form, fit, nor function of the optical card. The new optical card will perform the same as the current optical card and can work in the system with previous versions of the card, but it has the new part number and requires ERA system software V2.8.0 or higher.
- Adds additional SFP+ modules to Table 13, *SFP+ Modules Tested for Use with ERA*.
- Adds note to ERA modules to identify the modules that are hot-swappable.

Document Cautions and Notes

This document may contain any of the following notes, cautions, and warning icons.

The icon to the left is used to indicate a caution or warning. Cautions and warnings indicate operations or steps that could cause personal injury, induce a safety problem in a managed device, destroy or corrupt information, or interrupt or stop services.

The icon to the left indicates a caution or warning that pertains to laser equipment.

The icon to the left indicates a caution or warning that pertains to Radio Frequency (RF).

The icon to the left indicates that the hardware is susceptible to Electro-Static Discharge (ESD) damage.

The icon to the left indicates a caution or warning that pertains to an electrical hazard.

The icon to the left indicates a caution or warning that pertains to a fire hazard.

The icon to the left indicates a Note. Notes provide information about special circumstances.

Abbreviations Used in this Guide

AC	Alternating Current
AP	Access Point
AUT	Auxiliary Transport
AUX	Auxiliary
AXT	Alien Crosstalk
BDA	Bi-Directional Amplifier
BTS	Base Transceiver Station
C	Celsius
CAN	Central Area Node
CAP H	Carrier Access Point, High Power
CAP L	Carrier Access Point, Low Power
CAP M	Carrier Access Point, Medium Power
Cat	Category
CAT	Copper Transport
CMS	CommScope Mobility Solutions
dB	Decibel
dBc	Decibels (referenced to the carrier)
dBm	Decibel-milliwatts
DC	Direct Current
EFTA	European Free Trade Association
EMC	Electromagnetic Compatibility
EMEA	Europe, Middle East, Africa
EU	European Union
F	Fahrenheit
FCC	Federal Communications Commission
Gb	Gigabyte
Gbps	Gigabits per second (billions of bits per second)
GHz	Gigahertz
IFC	Interface Card
ISDE	Innovation, Sciences et Développement économique Canada
ISED	Innovation, Science and Economic Development Canada
kg	Kilogram
LCD	Liquid-Crystal Display
LED	Light Emitting Diode
Mbps	Megabits per second (millions of bits per second)
MHz	Megahertz
mm	Millimeter
MMF	Multi-Mode Fiber
OPT	Optical Transport
PN	Part Number
PoE	Power over Ethernet
POI	Point of Interface
PSU	Power Supply Unit
RAN	Regional-Area Network
RF	Radio Frequency
RFD	RF Donor
RTN	Return
RU	Rack Unit
SFP	Small Form-Factor Pluggable
SMF	Single-Mode Fiber
SNR	Signal-to-Noise Ratio
STP	Shielded -Twisted Pair
SUI	System User Inter-face
TEN	Transport Expansion Node
UAP	Universal Access Point
UTP	Unshielded Twisted Pair
V/m	Volt per meter
Vac	Voltage in Alternating Current
Vdc	Voltage in Direct Current
W	Watts

CommScope Part Numbers

The CommScope ERA part numbers listed in this installation guide are in the format of *nnnnnnn-xx*, where the "***-xx***" suffix indicates the latest release. Contact your local CommScope sales representative for the current release part number.

Table 2. *CommScope Rack Part Numbers*

CommScope Part Number	Description
7844068-xx	-48Vdc WCS-4 subrack (external -48 Vdc power supply)
7635442-xx	WCS-4 subrack (powered by ERA AC to DC PSU subrack and power modules)
7844067-xx	-48Vdc WCS-2 subrack (external -48 Vdc power supply)
7635443-xx	WCS-2 subrack (powered by ERA AC to DC PSU subrack and power modules)
7676311-xx	e-POI subrack
7693531-xx	PSU subrack
7152435	Accessory kit, includes 4 M6 screws and 4 cage nuts

ERA System Overview

CommScope ERA® coordinates wireless capacity throughout the entire coverage area via a single centralized head-end location or from an operator's existing C-RAN hub. ERA systems bring together licensed wireless and power, plus Gigabit Ethernet for WiFi into one wireless system that can scale to building size and is technology and spectrum agnostic and adaptive. An ERA system comprises the components listed below.

- **Central Area Node (CAN)**—provides server-level control and primary signal distribution. It combines the signals from multiple operators and distributes those signals within a venue or multiple venues. There are two configuration modes available for the CAN: **Classic** and **Switching**.
  - The **Classic CAN** configuration is appropriate for when all the BTS and Baseband sources are located in a centralized space in the same venue as the Classic CAN. You install RF Donor (RFD) Cards and CPRI Digital Donor (CDD) Cards in a Classic CAN, which digitizes the analog BTS signals from the RFD Cards and combines those with the BBU CPRI digital signals from the CDD Cards, and then distributes the RF signals to the TENs. The TENs then provide the RF signals to the Access Points (APs). The Classic CAN also supports APs that are directly connected to CAT or OPT Cards installed in the Classic CAN chassis. Wide-area Integration Nodes (WINs) are not supported by a Classic CAN. Users have full and flexible control of all signal routing via the ERA GUI.
  - The **Switching CAN** configuration is appropriate for when WINs are required to allow operators to bring in baseband signals from multiple remote locations to fully leverage the C-RAN architecture in their hubs. All operator Baseband signals (analog BTS and BBU CPRI) are supplied to the Switching CAN by the WINs, so no RFD or CDD Cards can be installed in the Switching CAN. The Switching CAN then combines the signals from all WINs and distributes those signals to the TENs, and the TENs provide the signals to the APs. APs are not directly connected to a Switching CAN. Users have full and flexible control of all signal routing via the ERA GUI.

This guide uses "CAN" to collectively refer to Central Area Nodes. When information pertains to a specific CAN mode, "Classic CAN" and "Switching CAN" will be used.

- **Wide-Area Integration Node (WIN)**—interfaces between a Switching CAN and RF sources, which makes C-RAN possible in ERA by allowing operators to bring in signals from multiple remote locations kilometers away. You install RFD and CDD Cards in the WIN, which takes the analog BTS signals from the RFD Cards and combines those with the BBU CPRI digital signals from the CDD Cards, and distributes the RF sources to a Switching CAN.
- **Transport Expansion Node (TEN)**—is an expansion node connected to the CAN via fiber and can be located throughout the venue coverage area. A single TEN can support, dependent on the AP type and powering method, 12 to 32 Access Points (APs), which greatly reduces the number of fiber runs between the head-end and each AP.
- **Access Point (AP)**—connects a Classic CAN or TEN to antennas or other wireless devices. On the downlink, an AP converts data arriving at the AP to analog signals and sends them to an antenna. On the uplink, received signals are digitized and serialized into data streams which are sent back to the Classic CAN or TEN. APs provide pass-through support for WiFi, IP cameras, or other devices over a common cable. An AP can be any of the Universal Access Points or Carrier Access Points.

This guide uses "Access Point (AP)" to collectively refer to all versions of the Universal Access Point (UAP) and the Carrier Access Point (CAP). "Fiber APs" collectively refers to the CAP H, CAP M, CAP MX, and the Fiber CAP L. When information pertains to a specific AP type, that AP will be identified.

WCS-2 AND WCS-4 SUBRACK OVERVIEW

The following sections provide information on the WCS-4 and WCS-2 Subracks, their Cards, Fan Trays and Filter Modules.

For information on power consumption of ERA system components, refer to the *ERA Solution Ordering Guide*.

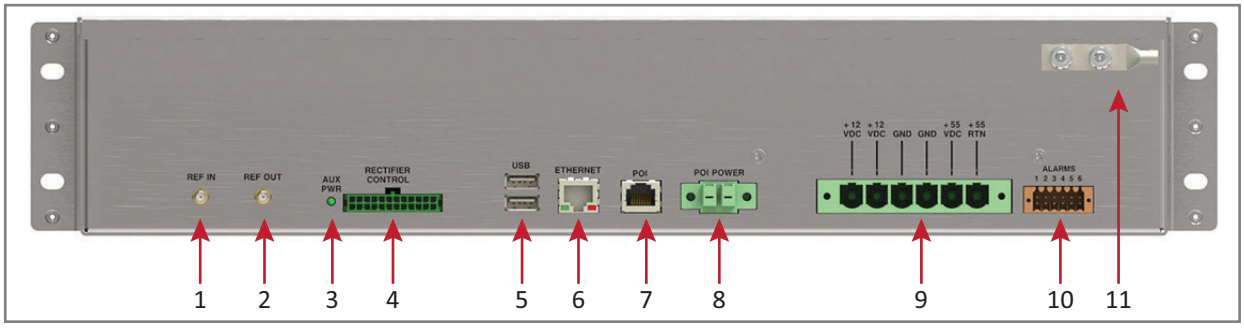
WCS-2 and WCS-4 Subracks

The following sections provide information on the WCS-4 and WCS-2 Subracks (Figure 1). How Cards are installed in the WCS-4 or WCS-2 Subrack, combined how the Subrack is configured in the ERA GUI determines whether the Subrack is a CAN, WIN, or TEN.

- The **WCS-4 (PN 7635442-xx)** is four Rack Units (RUs) high and is typically used as a CAN or a WIN but can also serve as a TEN. It is powered by the ERA AC to DC PSU subrack and power modules and can provide Power over CAT6A to UAPs and Copper CAP Ls.
- The **-48Vdc WCS-4 (7844068-xx)** is four Rack Units (RUs) high and is typically used as a CAN or a WIN but can also serve as a TEN. It is powered by an external -48 Vdc power supply. It is not capable of supplying Power over CAT6A to UAPs or Copper CAP Ls.
- The **WCS-2 (PN 7635443-xx)** is two RUs high, and is typically used as a TEN, but can also serve as a CAN or a WIN. It is powered by the ERA AC to DC PSU subrack and power modules and can provide Power over CAT6A to UAPs and Copper CAP Ls.
- The **-48Vdc WCS-2 (7844067-xx)** is two RUs high, and is typically used as a TEN, but can also serve as a CAN or a WIN. It is powered by an external -48 Vdc power supply. It is not capable of supplying Power over CAT6A to UAPs or Copper CAP Ls.
- The CAN is the server-level control and primary signal distribution within an ERA system.
- A TEN is a secondary distribution point that connects to a CAN using Multi-Mode or Single-Mode fiber.
- An ERA system supports one CAN, and the CAN can support up to 32 TENs in a one TEN to one CAN configuration. However, if you have two or more (up to four) fiber links between a particular TEN and its CAN, this reduces the number of TENs that can connect to a CAN. For example, if you have two fiber links for each TEN, then 16 TENs would be the maximum number of TENs that could be connected to the CAN.
- The WCS-4 and WCS-2 subracks and all subrack cards have an operating temperature range of +5 to +40 °C (+41 to +104 °F).

Figure 1. WCS-2 and WCS-4 Subracks

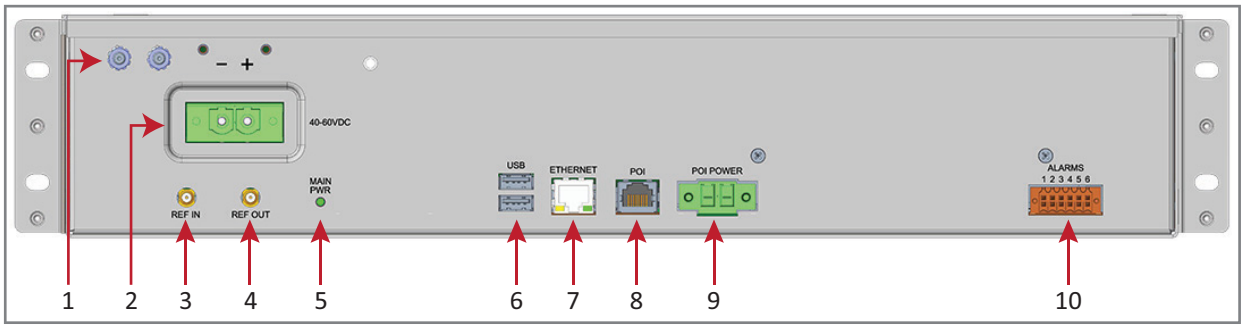
WCS Subrack Back Panel Connectors



WCS Subrack Back Panel Connectors		
Ref. #	**Component**	**Description**
1	REF IN connector	Reserved for use by CommScope.
2	REF OUT connector	Reserved for use by CommScope.
4	Rectifier Control connector	24-pin connector for PSU communication
5	USB connectors	Reserved for use by CommScope.
6	Ethernet connector	Connects to local laptop using http://192.168.1.1/
7	POI connector	Communications port that connects to the optional e-POI Subrack.
8	POI Power connector	12 Vdc to e-POI Subrack
9	Power connector	Inputs to the 12 Vdc Rectifier Module and the 57 Vdc Rectifier Module
10	Alarm connector	Dry contact input and output; see "-48Vdc WCS Subrack Back Panel Connectors" on page 14.
11	Ground stud	Ground (earth) connection to the Power Supply Subrack
WCS Subrack Back Panel LED		
Ref #	**LED**	**LED Color/Status**
3	AUX PWR	• On/Green when the Rectifier Control Cable is installed, and the PSU is powered on. • Off when either the PSU is off, or the PSU is on, but the control cable is unplugged.

To prevent SEVERE damage to the WCS Subrack, confirm that all AC power cables are unplugged from the rear of the PSU BEFORE plugging/unplugging the Rectifier Control cable into/from the WCS Subrack.

-48Vdc WCS Subrack Back Panel Connectors



-48Vdc WCS Subrack Back Panel Connectors		
Ref. #	**Component**	**Description**
1	Ground Studs	Ground (earth) connection to the Power Supply Subrack
2	DC Power Connector	-40 to -60 Vdc input connector for connection to -48 Vdc power supply
3	REF IN connector	Reserved for use by CommScope.
4	REF OUT connector	Reserved for use by CommScope.
5	Main Power LED	On/Green when -48 Vdc power supply is connected and powered on.
6	USB Connectors	Reserved for use by CommScope.
7	Ethernet connector	Connects to local laptop using http://192.168.1.1/
8	POI connector	Communications port that connects to the optional e-POI Subrack.
9	POI Power	Provides 12 Vdc to optional e-POI Subrack
10	Alarm connector	Dry contact input and output; see "-48Vdc WCS Subrack Back Panel Connectors" on page 14.

The -48Vdc DC power entry connector is hot plug/unplug tolerant and has reverse polarity protection.

WCS Subrack Alarm Connector

External alarms are connected to the WCS using a connector inserted into the alarms port located on the rear of the WCS.

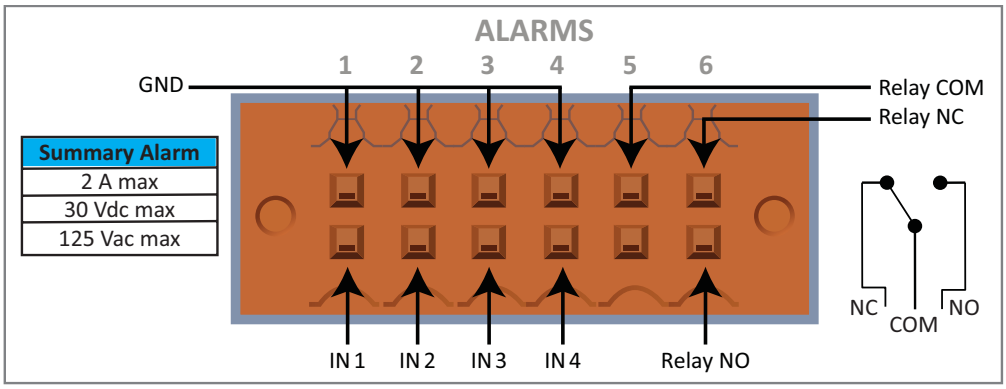
The alarm connector on the WCS-4 and WCS-2 Subracks has the following inputs:

- four opto-isolated (chassis-ground referenced) dry contact inputs to monitor external devices. The alarm state is activated when the alarm input is pulled to ground. The alarm input is referenced to chassis ground, and the alarm ground is tied to the chassis ground.
- a Summary Alarm Relay that energizes when specific alarms are triggered-the thresholds, shown in the following graphic. The Summary Alarm state changes whenever there is an alarm on the system and returns to its default state when there are no alarms. Depending on which contacts you use the default state is either Normally Closed or Normally Open.

The alarm connector on the WCS-4 and WCS-2 Subracks has the following output:

- The external alarm output is activated at the CAN whenever there is a critical or major alarm in the system. The alarm output is provided by a relay. The relay contact resistance is <30m?. The relay can carry 5A. Both normally open and normally closed terminals are available. The relay provides 3000 VAC isolation.

Included in the box, the mating connector for the Alarm connector (header) is Weidmuller part 1748040000.



The following table shows the alarm connector details for the system parameters.

System parameters	
Conductor connection system	Tension clamp connection
Outgoing direction of conductor	180°
Pitch	3.5 mm
Pitch in inch	0.138 inch
No. of poles	12
No. of rows	2
Stripping length	7 mm
L1 in mm	17.5 mm
L1 in inch	0.689 inch
Electric shock protection to DIN VDE 0470	IP 20
Electric shock protection to DIN VDE 0470	Safe from finger touch

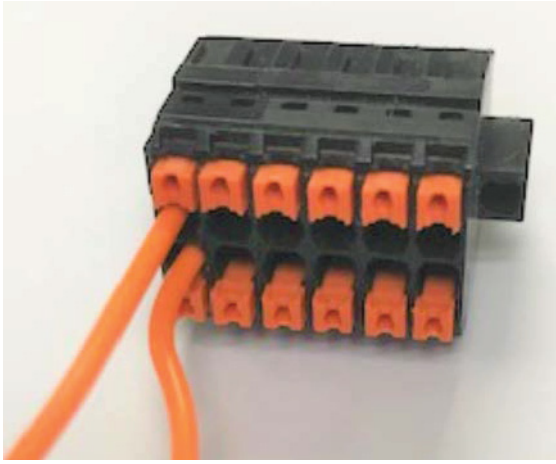
The following table shows the alarm connector details for the connectable conductors.

Connectable conductors	
Clamping range, max.	1 mm²
AWG, min.	28
AWG, max.	18
Solid, min. H05(07) V-U	0.2 mm²
Solid, max. H05(07) V-U	1 mm²
Flexible, min. H05(07) V-K	0.2 mm²
Flexible, max. H05(07) V-K	1 mm²
With wire end ferrule, acc. to DIN 46 228/1, min.	0.13 mm²
With wire end ferrule, acc. to DIN 46 228/1, max.	0.34 mm²
w. plastic collar ferrule, DIN 46228 pt 4, min.	0.13 mm²
w. plastic collar ferrule, DIN 46228 pt 4, max.	0.34 mm²

Before inserting the external alarms connector into the WCS alarms port, insert the conductors carrying the alarm signals into the alarm connector. The alarm connector provides tension clamp connections in the mating connector. The wires carrying the alarm signals should be stripped back by 7mm and then inserted into the alarm connector. The alarm wires can be released by pushing on the orange button by the wire to release the tension clamp, and then extracting the wire. The alarm wires can be from sizes 18 awg – 28 awg.

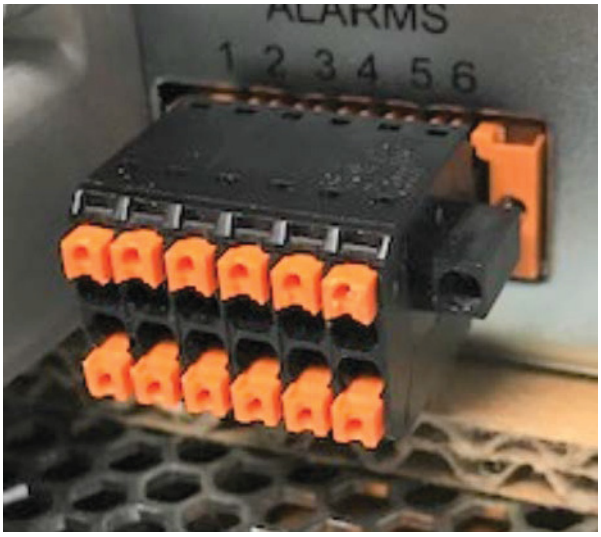
Typically, the alarm wires are connected to the mating connector first, then the mating connector is plugged into the alarm connector on the back panel of the WCS and screwed into place.

Mating connector with alarm wires connected



Alarm port on WCS back panel

Mating connector inserted into WCS alarm port



This connector should have wires attached, so it matches the recommendation of inserting the wires into the connector first.

WCS Subrack Slot and Card Assignments

The following subsections detail which cards can be installed in which Subrack slots, dependent on the function assigned to the Subrack in the GUI.

If wrong type of card is plugged into a slot, the following will occur:

- The following alarm will be raised: **General Slot Alarm: Module plugged into wrong slot**. If you clear this alarm by clicking the **X** in the row that corresponds to it on the **Active Alarms** page without removing the card, the slot will remain disabled without an alarm, and the alarm will reappear after the next reboot.
- The Slot in which the incorrect card was installed will be disabled.

If you remove the wrong card from a slot, the following will occur:

- The Slot in which the incorrect card was removed will be enabled.
- The following alarm will be raised: **General Alarm: No card detected in slot**.

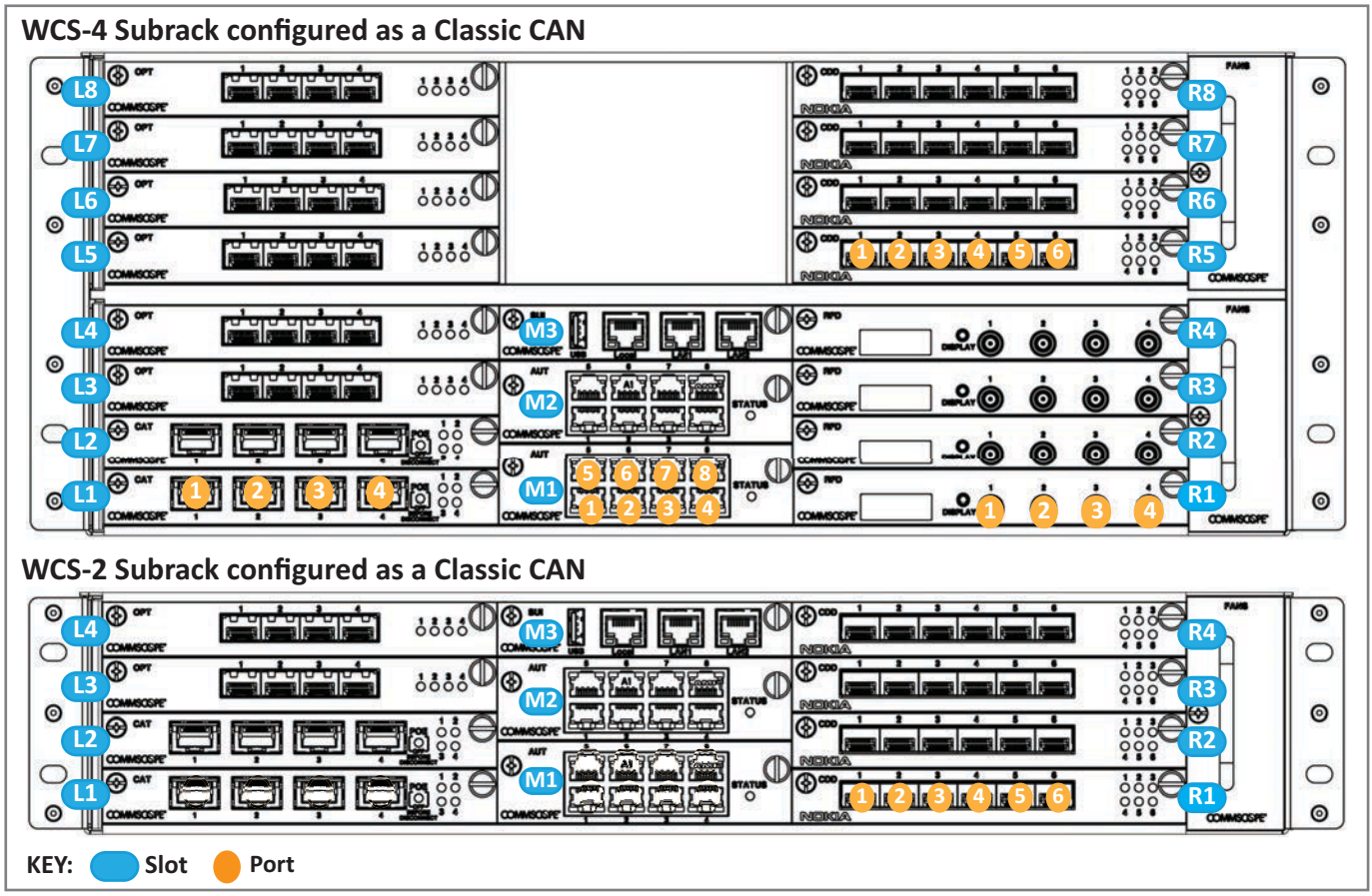
When an appropriate card is inserted into the slot from which the incorrect card was removed, the software will detect the card and clear the **General Slot Alarm**. If you don't insert a card into the slot, you must manually remove the alarm by clicking the **X** in the row that corresponds to that alarm on the **Active Alarms** page.

The following alarm will occur whenever a card is removed from its slot: General Alarm: No card detected in slot.

To maximize airflow through the PSU chassis, blank filler panels must be installed in all empty slots. If additional blank filler panels are required, order the ERA Power Supply Filler Panel (PN 7694140) from CommScope. For ordering information, contact your distributer, or customer service, or their sales account manager.

Slot and Card Assignment Rules for Classic CANs

Figure 2 lists the card installation rules for a WCS-4 or WCS-2 Subrack configured in the GUI to function as a Classic CAN, in which case the CAN will *not* be connected to a WIN.



Card Slot	Supported Card Type
L1 - L4 [1]	Install either a CAT Card or an OPT Card, as follows: • Install an OPT Card to connect to a TEN, CAP H, CAP M, or Fiber CAP L. [2] • Install a CAT Card to connect to a UAP or Copper CAP L.
L5 - L8 [1]	Install OPT Cards to connect additional TENs.
M1 - M2	Install AUT Card(s) as required for a 1 Gbps pass-through connection between the Classic CAN and the APs that are directly connected to the CAN.
M3	Install a SUI Card for network connectivity.
R1 - R8	Install either an RFD Card or a CDD Card, as follows: • Install an RFD Card to communicate with a BTS. • Install a CDD Card to communicate with a BBU.

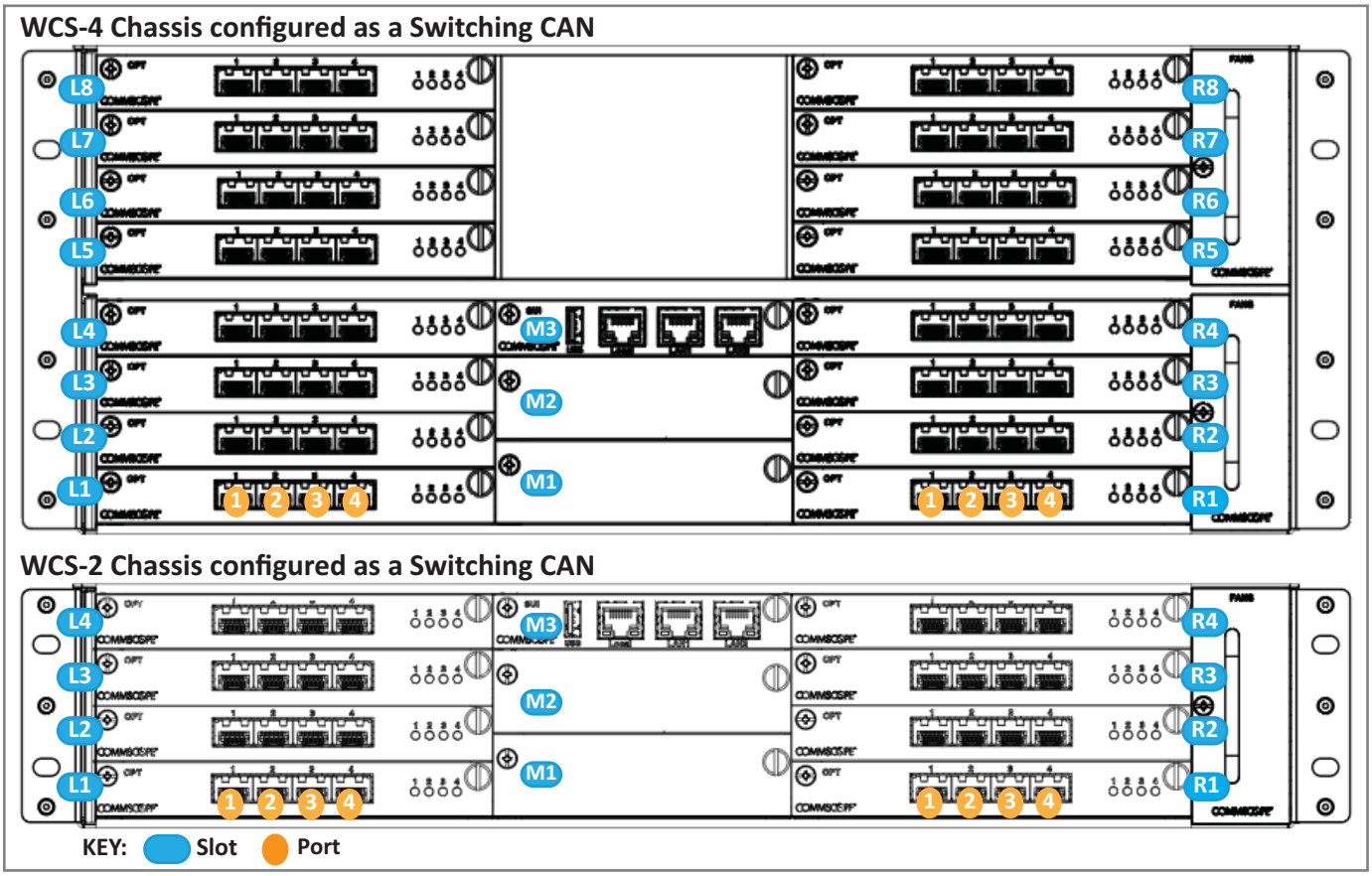
Figure 2. Supported Slot and Card Installations for Classic CANs

For information on how to configure the WCS Subrack as a Classic CAN in the ERA software, refer to the ERA configuration guide for Software Version 2.5 or later; see "Accessing ERA Series User Documentation" on page 82.

-48Vdc WCS configured as Classic CANs or TENs do not provide Power over CAT6A for Copper CAP Ls or UAPs. The standard WCS subracks using the 57V rectifier modules in the PSU subrack are required.

Slot and Card Assignment Rules for Switching CANs

Figure 3 lists the card installation rules for a WCS-4 or WCS-2 Subrack configured in the GUI to function as a Switching CAN, in which case the CAN *will* be connected to a WIN.



Card Slot	Supported Card Type
L1 - L8	Install an OPT Card to connect to a TEN.
M1 - M2	Not supported/used.
M3	Install a SUI Card for network connectivity.
R1 - R8	Install an OPT Card to connect to a WIN.

Figure 3. Supported Slot and Card Installations for Switching CANs

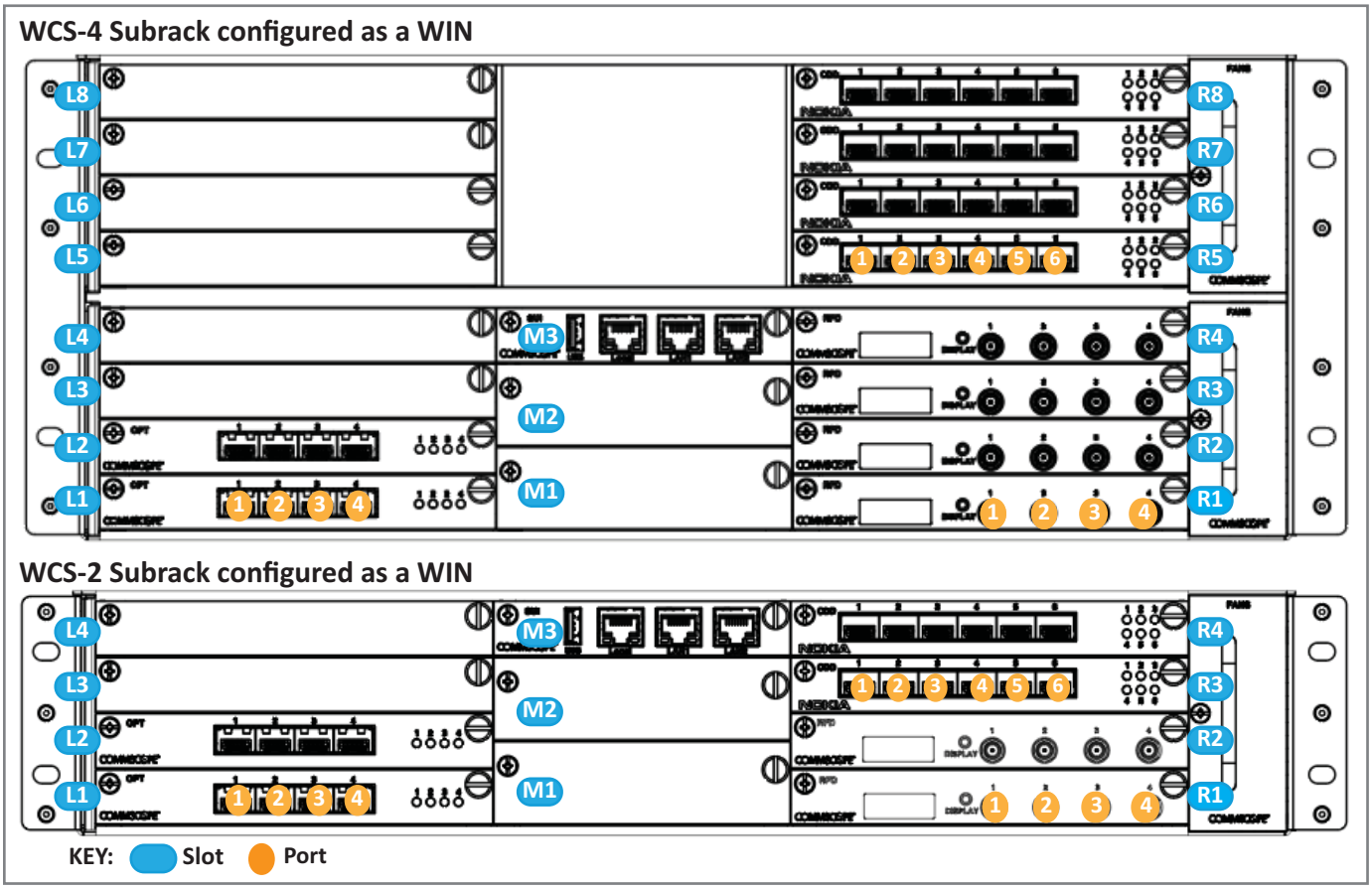
The following additional rules apply to a Switching CAN.

- You cannot directly connect APs to a Switching CAN; connect the APs to a TEN that then connects to the Switching CAN.
- You cannot install a CAT, AUT, RFD, or CDD Card in a Switching CAN.

For information on how to configure the WCS Subrack as a Switching CAN in the ERA software, refer to the ERA configuration guide for Software Version 2.5 or later; see "Accessing ERA Series User Documentation" on page 82.

Slot and Card Assignment Rules for WINs

Figure 4 lists the card installation rules for a WCS-4 or WCS-2 Subrack configured in the GUI to function as a WIN.



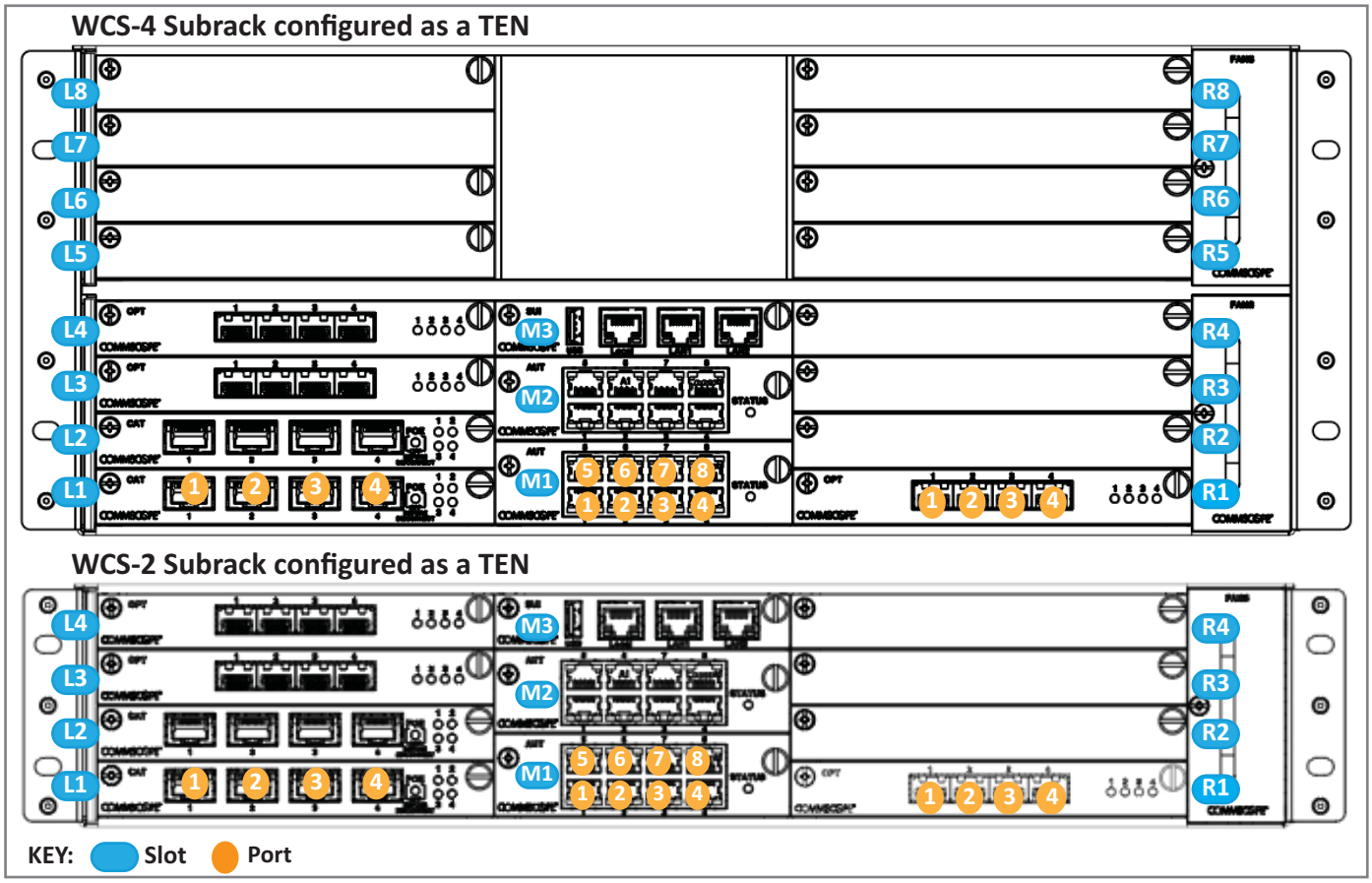
Card Slot	Supported Card Type
L1 - L2	Install an OPT Card, as described below. • Use Port L1.1 to connect to the Switching CAN. • Use Ports L1.2 through L2.4 for additional WIN-to-CAN links to increase the WIN bandwidth to support multiple operators and sectors.
L3 - L8	Not supported/used.
M1 - M2	Not supported/used.
M3	Install a SUI Card for Ethernet access to the WIN via the SUI Card's Local port if needed. It is not possible to assign a network IP address to a port when the SUI Card is installed in a WIN.
R1 - R8	Install either an RFD Card to communicate with a BTS, or a CDD Card to communicate with a BBU.

Figure 4. Supported Slot and Card Installations for WINs

For information on how to configure the WCS Subrack as a WIN in the ERA software, refer to the ERA configuration guide for Software Version 2.5 or later; see "Accessing ERA Series User Documentation" on page 82.

Slot and Card Assignment Rules for TENs

Figure 5 lists the card installation rules for a WCS-4 or WCS-2 Subrack configured in the GUI to function as a TEN.



Card Slot	Supported Card Type
L1 - L4	Install either a CAT Card or an OPT Card, as follows: • Install an OPT Card to connect to a CAP H, CAP M, or Fiber CAP L. • Install a CAT Card to connect to a UAP or Copper CAP L. **(Note: -48Vdc WCS subracks do not provide Power over CAT6A for UAPs or Copper CAP Ls. The standard WCS subracks using the 57V rectifier modules in the PSU subrack are required.)**
L5 - L8	Not supported/used.
M1 - M2	Install AUT Card(s) as required for a 1 Gbps pass-through connection between the TEN and the APs that are directly connected to the TEN.
M3	Install a SUI Card for Ethernet access to the TEN via the SUI Card's Local port if needed. It is not possible to assign a network IP address to a port when the SUI Card is installed in a TEN.
R1	Install an OPT Card and use • Port R1.1 to connect to the CAN • Ports R1.2 through R1.4 for additional TEN-to-CAN links.
R2 - R8	Not supported/used. (TENs do not support or use RFD or CDD Cards.)

Figure 5. Supported Slot and Card Installations for TENs

For information on how to configure the WCS Subrack as a TEN in the ERA software or allowing the CAN to configure the Subrack as a TEN, refer to the ERA configuration guide for Software Version 2.5 or later; see "Accessing ERA Series User Documentation" on page 82.

WCS Subrack Cards

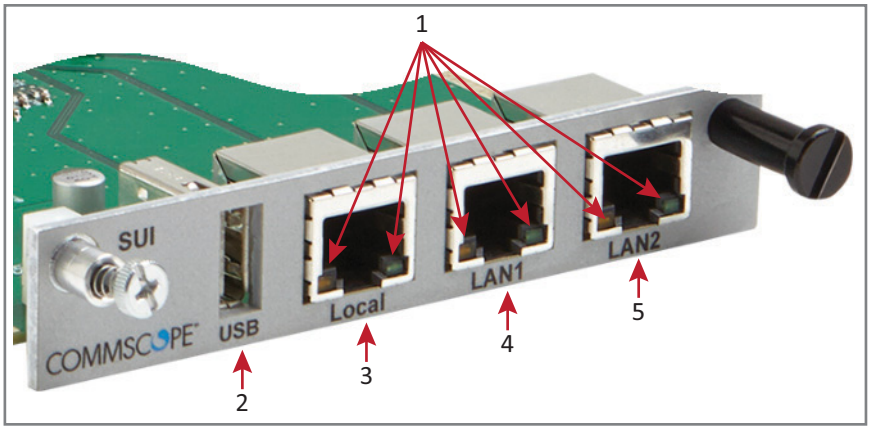
The following sections describe the cards that can be installed in a WCS Subrack.

- "System User Interface (SUI) Card" on page 22
- "RF Donor (RFD) Card" on page 23
- "Optical Transport (OPT) Card" on page 25
- "Copper Transport (CAT) Card" on page 26
- "Auxiliary Unit Transport (AUT) Card" on page 27
- "CPRI Digital Donor Card" on page 28.

System User Interface (SUI) Card

The SUI Card (PN 7642125-xx) provides local and LAN Ethernet connections and a USB port. You install only one SUI Card in a Subrack, and it must always be installed in Slot M3.

The following graphic and table identify the SUI Card LEDs and connectors.



SIU Card LEDs			
Ref #	**LED**	**LED Color**	**Description**
1	Right	• Off	• No link.
		• Green	• Link established with device to which the port is connected.
		• Flashing green	• Activity is occurring on that port.
	Left	• Off	• 10 Mb connection established.
		• Yellow	• 100 Mb connection established.
SIU Card Connectors			
Ref #	**Component**	**Device**	**Function**
2	USB port	2.0 USB	Reserved for use by CommScope.
3	Local port	RJ-45 jack (female)	Connects to a local laptop; DHCP or specified fixed IP address.
4	LAN1 port	RJ-45 jack (female)	Reserved for future use.
5	LAN2 port	RJ-45 jack (female)	Connects to a LAN or modem; DHCP or specified fixed IP address.

RF Donor (RFD) Card

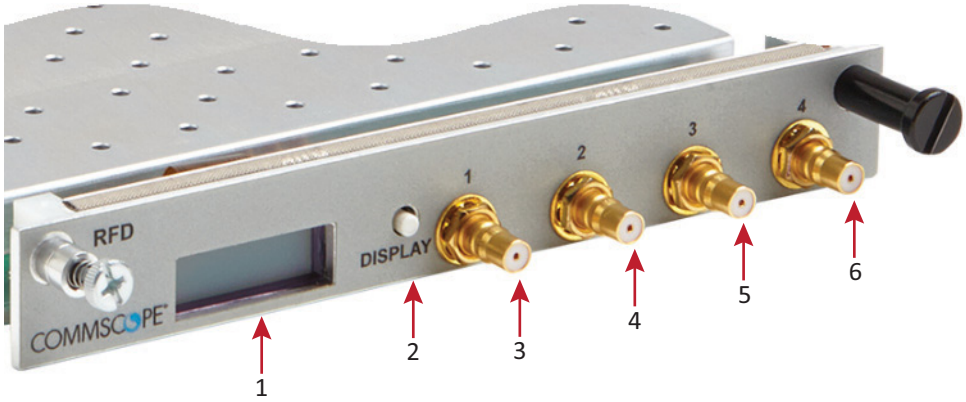
The RFD Card (PN 7633229-xx) is the interface for RF signals between the CAN or WIN and the RF source (such as the BTS, eNodeB, BDA, or e-POI). You can only install RFD Cards in a Subrack that is configured as a Classic CAN or WIN as follows:

- WCS-2: Slots R1 - R4; you can install up to four RFD Cards in a WCS-2.
- WCS-4: Slots R1 - R8; you can install up to eight RFD Cards in a WCS-4.

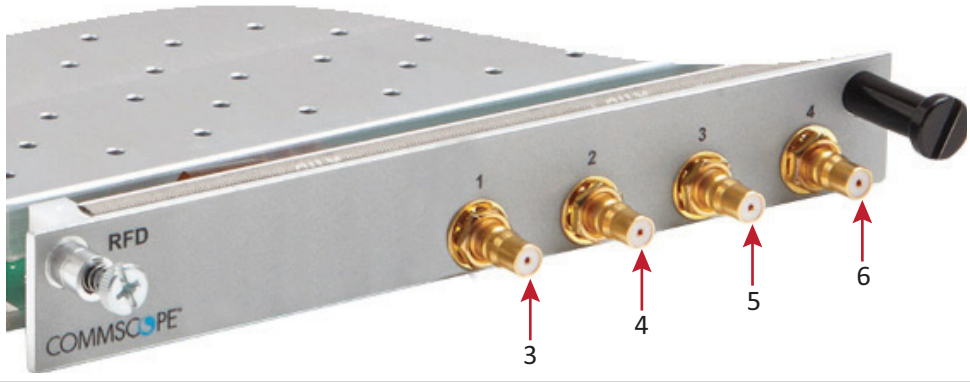
CAP M and CAP H APs require the use of RFD Card PN 7633229-01 or 7633229-02 or higher. RFD Card PN 7633229-03 is the current version.

The following graphic and table identify the RFD Card components.

RFD Card PN 7633229-01



RFD Card PN 7633229-02 and higher



Ref #	Component	Device	Function
1	Display [1]	LCD	• The first line of the display shows the port number and band. • The second line of the display shows the service provider or **multiple** if multiple providers are connected to the port.
2	Display button [2]	Push button	Push once to turn on the display backlight, and then push four more times to cycle through the four ports.
3	Port 1 [3, 4, 5]	Female QMA connector	Connect to the UL/DL ports of the RF Source. If 30 dB of attenuation is required, can connect to UL/DL Ports 1 - 4 on an e-POI Module in an optional e-POI Subrack: • RF Paths: duplex and simplex supported • Frequency: 380 - 2700 MHz
4	Port 2 [3, 4, 5]		
5	Port 3 [3, 4, 5]		
6	Port 4 [3, 4, 5]		

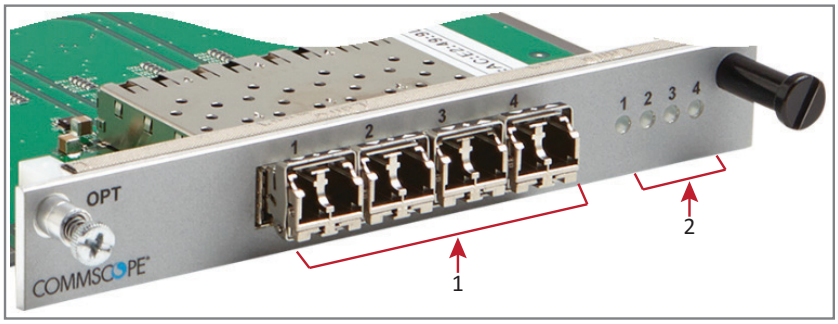
1 RFD Card PN 7633229-02 and higher do not include an LCD display.
2 RFD Card PN 7633229-02 and higher do not include a Display button.
3 Path 1 and Path 2 of an LTE MIMO 2x2 eNodeB must be connected to either Ports 1 and 2 of the RFD Card as a pair, or to Ports 3 and 4 as a pair.
4 All four paths (AP0, AP1, AP2, AP4) of an LTE MIMO 4x4 eNodeB must be connected to the duplex ports of a single RFD Card. Simplex is not supported for MIMO 4x4.
5 Simplex ports typically can be any two ports on the same RFD Card, except for simplex ports supporting LTE MIMO 2x2 must be configured as follows: pair Port 1 DL with Port 3 UL, and pair Port 2 DL with Port 4 UL.

Optical Transport (OPT) Card

The OPT Card (PN 7642123-xx) provides a 10 Gbps fiber connection between CANs, TENs, and WINs; and between CANs and TENs and Fiber APs. If a CAN requires that Slots L1 - L8 all have an OPT Card installed to support a full complement of TENs, you must use the TENs to connect the APs. CommScope R&D has updated the (7642123-00) OPT Card with new subcomponents to prevent material delays. The new (7642123-01) OPT Card has the same the form, fit, function, and performance as the previous card. Both versions of the card can work in the same system, but the 7642123-01 card requires ERA system software V2.8.0 or higher.

- For rules on where an OPT Card is installed in a WCS Subrack, see "WCS Subrack Slot and Card Assignments" on page 17.
- For rules that apply to OPT Cards and cascading Fiber CAP Ls, CAP Ms, or CAP Hs, refer to the Fiber CAP Ls, CAP M, and CAP H installation guides; see "Accessing ERA Series User Documentation" on page 82.

The following graphic and table identify the OPT Card connectors and LED.



OPT Card SFP Connectors			
Ref #	**Component**	**Device**	**Function**
1	1 - 4	10 Gbps SFP port for Multi- or Single-Mode fiber	Support for up to four SFP+ Modules; each SFP port provides high-speed fiber connections between a CAN and a TEN, a CAN and a WIN, a TEN and a Fiber AP, or a Classic CAN and a fiber AP.
OPT Card SFP Port LEDs [1]			
Ref #	**LED**	**LED Color**	**Description**
2	1 - 4	• Off	• The OPT Card has no power, or the OPT Card is plugged into the wrong Subrack slot (see "WCS Subrack Slot and Card Assignments" on page 17).
		• Green	• Optical link is established with device to which the port is connected.
		• Yellow	• The OPT Card is powered and initialized, but the link with the corresponding SFP port is not established. Problems that can activate the yellow LED include but are not limited to the following: an issue with the physical layer, dirty fiber, micro/macro bends, bad splice/terminations, excessive optical loss.
1 SFP Port LED numbers correspond with the SFP port numbers.			

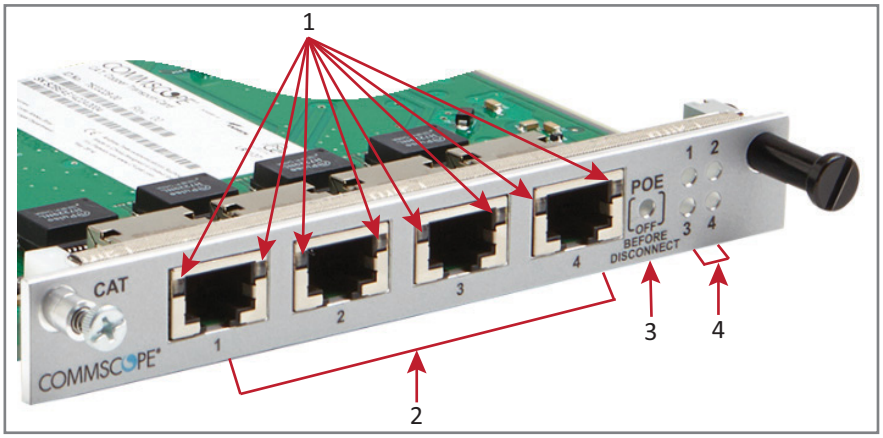
Copper Transport (CAT) Card

The CAT Card (PN 7633228-xx) provides power and 10 Gbps data over Cat6A cables to Access Points (APs).

- You install a CAT Card in Slots L1 - L4 of the Subrack.; see the rules listed in "WCS Subrack Slot and Card Assignments" on page 17.
- For rules that apply to CAT Cards and cascading UAPs or Copper CAP Ls, refer to the UAP and Copper CAP L installation guides; see "Accessing ERA Series User Documentation" on page 82.
- For rules that apply when there is a mixture of AP types in a system and all the APs are powered over Cat6A cabling, refer to the UAP and Copper CAP L installation guides; see "Accessing ERA Series User Documentation" on page 82.

At least one 57 Vdc Power Rectifier Module must be installed in the Power Supply Subrack to use a CAT Card; please see "57 Vdc Power Rectifier LEDS" on page 35. Note: -48 Vdc WCS subracks (PNs 7844067-xx, 7844068-xx) do not supply Power over CAT6A to UAPs or Copper CAP L APs.

The following graphic and table identify the CAT Card LEDs and connectors.

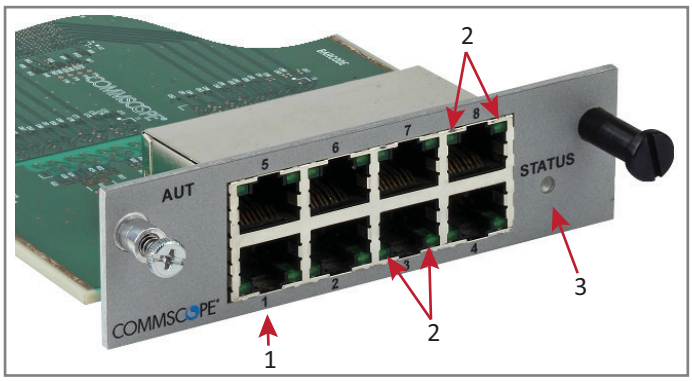


CAT Card LEDs			
Ref #	**LED**	**LED Color**	**Description**
1	RJ45 1 - 4	• Off	• No link between the CAT Card and the AP to which the port is connected. Loss of link may be caused by and is not limited to any of the following: cable length is >100m, bad terminations, interference, device not connected, bad coaxial cable, hardware problem.
		• Green	• Indicates that a 10G link is established.
		• Yellow	• An unsupported device is connected.
3	POE	• Off	• 57 Vdc power is not available.
		• Green	• CAT Card is installed in WCS Subrack Slot L1, L2, L3, or L4 and 57 Vdc power is available.
4	Port	• Off	• Always off, currently not used for any status.
CAT Card Connectors			
Ref #	**Component**	**Device**	**Function**
2	Port 1 - 4	RJ45, Cat6A	Connects to APs over Cat6A cables.

Auxiliary Unit Transport (AUT) Card

The AUT Card (PN 7642132-xx) provides a 1 Gbps pass-through connection between Classic CANs and TENs and APs for WiFi, IP cameras, or other gigabit Ethernet devices. Switching CANs do not support AUT Cards. (For information on the internal mapping between CAT Cards and AUT Cards, and for rules pertaining to connecting an AUT Card, see "Connect the AUT Cards" on page 72.)

The following graphic and table identify the AUT Card LEDs and connectors.



AUT Card LEDs			
Ref #	**LED**	**LED Color**	**Description**
2	Left LED on RJ45 Ports 1 - 8	• Off	• No activity on that port.
		• Flashing green	• Activity on that port.
	Right LED on RJ45 Ports 1 - 8	• Off	• Port is transmitting 1 Gbps.
		• Green	• Port is transmitting 100 Mbps or is not connected.
3	STATUS	• Off	• Error on the AUT Card, or AUT Card is not receiving power.
		• Green	• AUT Card functioning as expected.
		• Red	• AUT Card is experiencing an error.

AUT Card Connectors			
Ref #	**Component**	**Device**	**Function**
1	Ports 1 - 8	RJ45 ports	Provides a 1Gbs pass-through connection from a network connection on the AUT card to a WiFi, IP camera, or other 1Gbps Ethernet device connected to the AP paired with the AUT port.

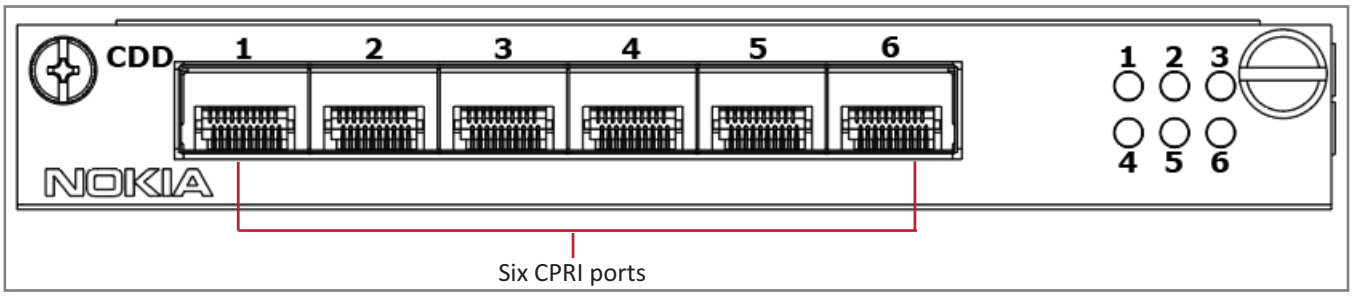
CPRI Digital Donor Card

A CPRI Digital Donor (CDD) Card installs into a Classic CAN or WIN to provide a digital CPRI interface between a Nokia BBU and the WCS Subrack, and to distribute CPRI signals to connected APs.

CDD Cards support LTE configurations only.

CDD Card CPRI Ports

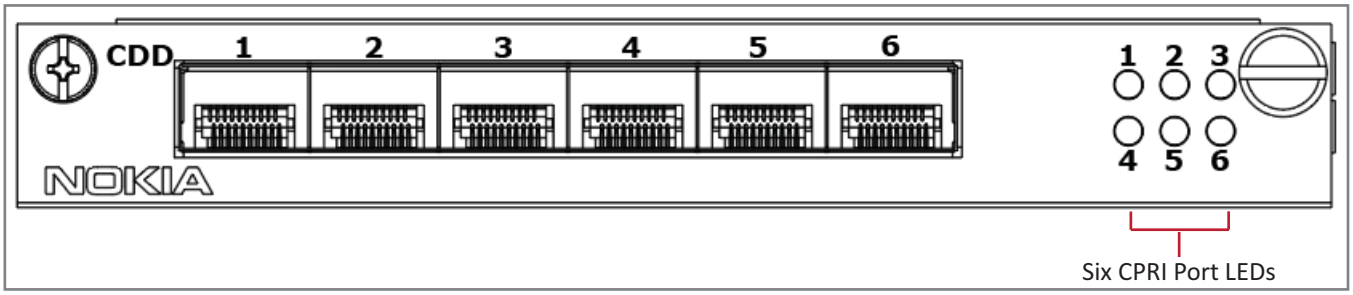
Each CDD Card has six SFP ports, as shown below. Each port provides one CPRI link between the BBU and the CDD Card. While MSA compliant, the CPRI ports are designed for a specific line rate offered by Nokia. Maximum transceiver power per CPRI Port is 2W.



Do not use CommScope ERA SFP+ Modules in the CDD Card. Contact your local Nokia sales representative to obtain the required number of SFP Modules for this installation.

CDD Card CPRI Port LEDs

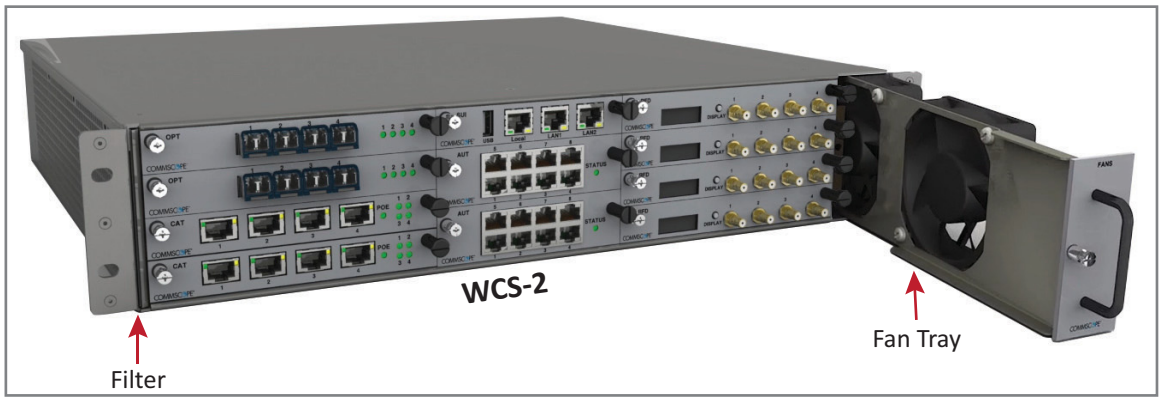
A CDD Card has six LEDs that correspond to its six CPRI ports, as shown in the following graphic and table.



LED Color	Affected LEDs	State
Off	All six	No power to the CDD Card. If this state is not expected, do the following in the order presented: 1 Verify that the CAN is powered on (the CAN powers the CDD). 2 Verify that the CDD Card is enabled; the default setting is **Off** (disabled) and must be manually set to **On** (enabled). 3 Reseat the CDD Card in its slot or move it to another slot to make sure there is firm connectivity with the WCS Subrack.
Flashing Red	All six	Can be any of the following: • External Power Supply Failure—board power failure. • There is a boot error.
	CPRI port specific	• CPRI port is not communicating with the WCS/CAN.
Solid Red	All six	Can be any of the following: • CDD Card is receiving power, but its FPGA has not loaded. • CDD Card is in Bootloader mode and its RAM test failed.
	CPRI port specific	• An SFP Module is not present in the CPRI port, but the CDD Card is configured via the ERA software. Verify that there is an SFP Module installed and is firmly seated in the CPRI port.
Flashing Amber	All six	Firmware download is in process. Note that this process includes matching the CDD Card firmware to the ERA Software Version running on the CAN in which the CDD Card is being installed. If the firmware on the CDD Card is different from the CAN, it will take slightly longer to download the firmware to the CDD Card. Wait until the LEDs are solid amber before configuring the CDD Card.
Solid Amber	All six	Can be any of the following: • All firmware updates have been pushed to each port and the CDD Card is ready to be configured. • The port has been configured from the DAS side, but the BBU has not provided a carrier yet.
Flashing Green	CPRI port specific	The BBU has provided a carrier, but the Signal Set has not yet been created and linked to an AP.
Solid Green	CPRI port specific	Port is configured for a Carrier and the Signal Set is being distributed to an AP.

WCS Subrack Fan Trays and Filter Modules

The Fan Tray and Filter Modules cool the WCS Subrack and all its cards. Fan Trays (PN 7635468-xx) and Filter Modules (PN 7700691-xx) are factory installed in the WCS Subrack.



The following rules apply to their use:

- Filters are on the left side of the WCS chassis and Fan Trays are on the right side of the WCS chassis.
  - A WCS-2 requires one Fan Tray and one Filter.
  - A WCS-4 requires two Fan Trays and two Filters.
- Fan Tray(s) and Filter Module(s) must be installed for WCS operation, but they can be replaced without system interruption.

For information on how to maintain the Filter Modules, refer to "WCS Subrack Filter Module Maintenance" on page 77.

Cat6A Cables and Connectors

The rules listed below must be observed for all ERA installations that utilize Cat6A cabling when connecting UAPs or Copper CAP Ls.

- Plenum rated cable must be used wherever it is required by local electrical codes.
- Cat6A shielded-twisted pair (STP) is not required unless operating in a high RFI/EMI environment.
- An ERA system requires a minimum Signal-to-Noise Ratio (SNR) of 25 dB, and Alien Crosstalk (AXT) must not degrade SNR on any cable by more than 0.5dB.
- Cat6A cable wire size requirements are as follows:
  - 23 AWG Cat6A cable (minimum EIA/TIA standards) must be used between RJ-45 connector points
  - 24 AWG is the minimum wire size allowed for a Cat6A Patch Cord.
- CommScope strongly recommends using factory terminated and tested Cat6A Patch Cord.
- There can never be more than two RJ-45 connections in a Cat6A cable run, as described below and as shown in Figure 6. Minimizing these connections improves the link margin.
  - In a non-cascade, between the CAT Card and the AP, there can be one Cat6A Patch Cord at the start of a Cat6A cable run and a second Cat6A Patch Cord at the end of a Cat6A cable run.
  - In a cascade, between the Primary AP and the Secondary AP, there can be one Cat6A Patch Cord at the start of a Cat6A cable run and a second Cat6A Patch Cord at the end of a Cat6A cable run.

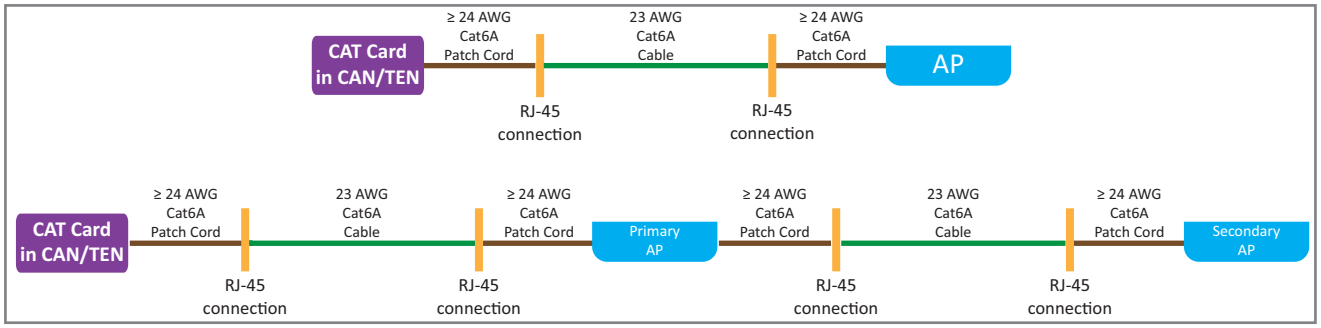


Figure 6. Maximum Number of RJ-45 Connections in Cable Runs

- Unshielded Cat6A (Category 6A U/UTP) twisted pair cable that meets ANSI/TIA-568-C.2, CENELEC EN 50173 series, and ISO/IEC 11801:2002 including its amendments 1 and 2, is suitable for use in an ERA system. The CommScope GigaSPEED X10D® 2091B ETL Verified Category 6A U/UTP Cable (760107201, 2091B BL 4/23 W1000) meets these requirements and is recommended.

  There are many parameters that impact the SNR of the 10GBase-T signal received by the CAT Card from the AP, or received by the AP from the CAT Card. For example, excessive insertion loss degrades the signal level, which results in a degraded SNR. An increase in the noise level will also result in degraded SNR. The most common sources of noise are NEXT (near end crosstalk, interference from pairs within a cable that couple from the TX to RX), and AXT (alien crosstalk, interference from adjacent cables). Additionally, there can be interference from outside sources such as lighting, switching power supplies, radio transmitters in the UHF and VHF bands, and similar sources of RFI/EMI. To guarantee acceptable SNR level, all cable key parameters must be measured as discussed in the next section.

- For information on how to test your Cat6A cables and connections, see "Cat6A Specifications and Testing Requirements" on page 80.

Power Supply Unit Subrack and Rectifier Modules

The following sections describe the ERA Power Supply Subrack and the 12 Vdc and 57 Vdc Rectifier Modules.

The Power Supply subrack and rectifier modules supply power to the WCS-2 (7635443-xx) and WCS-4 (7635442-xx) subracks. The power for the -48 Vdc WCS-2 (7844067-xx) and WCS-4 (7844068-xx) subracks is supplied by external -48 Vdc power supplies.

Power Supply Unit Subrack

The ERA Power Supply Unit (PSU) Subrack (PN 7693531-xx) can house two 12 Vdc Rectifier Modules and two 57 Vdc Rectifier Modules that provide power to the WCS Subracks, APs, and connected devices.

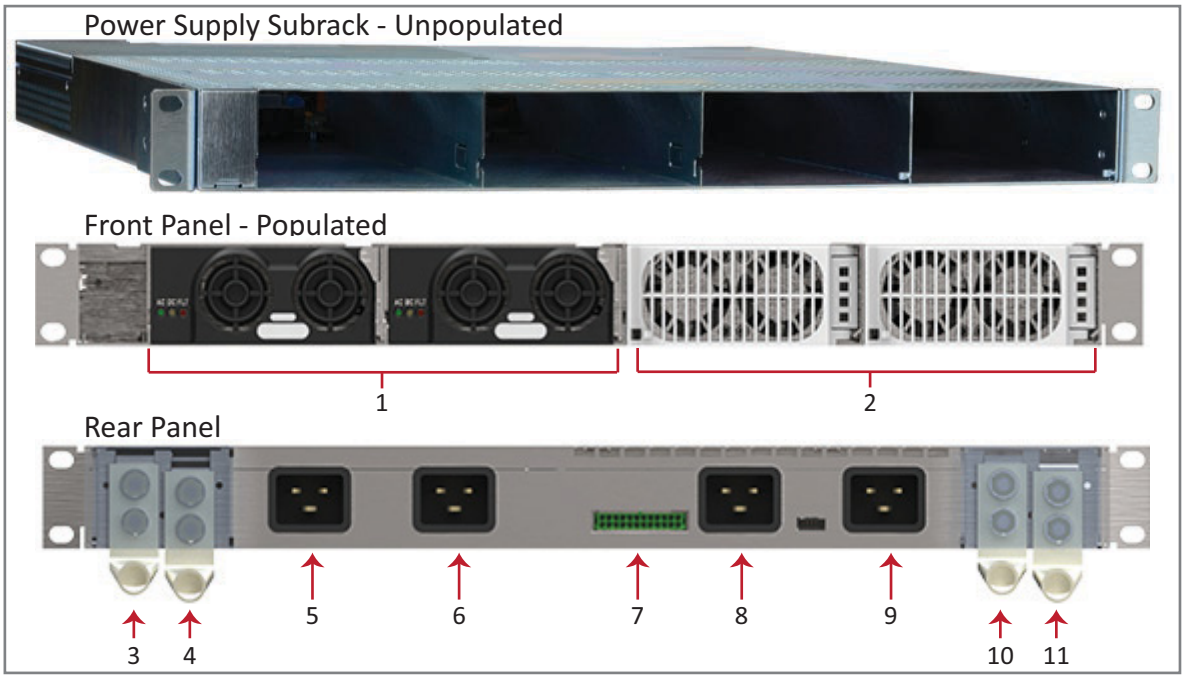
The PSU ships with the output DC cables already attached. The signal cable for connecting the PSU to the chassis is also provided and must be connected prior to powering on the unit. However, you can order input AC cables that are specific to the region in which the ERA system is installed, as shown in Table 3. Contact your local CommScope sales representative for assistance in ordering an AC Power Cable.

Table 3. *ERA AC Power Cable Assemblies*

CommScope PN	Power Cable Assembly Description
7680997-xx	UK Bs1362/ass145 to C19
7681032-xx	US NEMA L6-20p to C19
7681034-xx	US NEMA 5-15 to C19
7681049-xx	Italy Cei 23-50 to C19
7681038-xx	Is Si 32 to C19
7681036-xx	EU Cee (7) Vii to C19
7681030-xx	AUS As/nzs 3112 to C19

The 12 and 57 Vdc Rectifier Modules have an operating temperature range of -10 to +55 °C (+14 to +131 °F).

The following graphic and table identify the PSU modules and connectors.



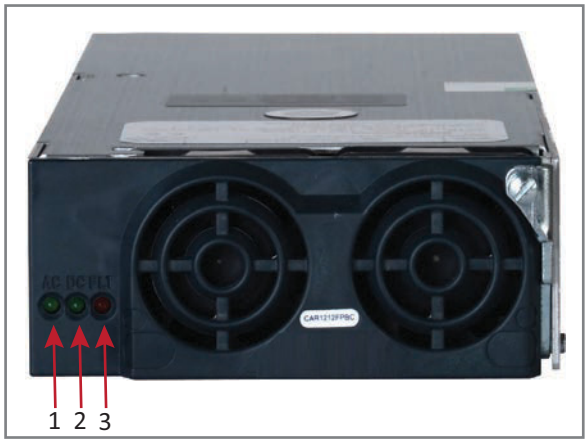
Ref #	Component	Device	Function
1	12 Vdc Rectifier Module	Power module	Provides 12 Vdc power to the WCS and e-POI Subracks.
2	57 Vdc Rectifier Module	Power module	Provides remote power over Cat6A for the AP and its connected devices.
3	57Vdc Output	Power terminal	Provides the connection point for the Positive (Red Wire).
4	GND Output	Power terminal	Provides the connection point for the RTN Negative (Black Wire).
5	AC Input (IEC 60320 C19)	Power connector	Provides the AC connection point for the for 57 Vdc Rectifier Module Slot 4.
6	AC Input (IEC 60320 C19)	Power connector	Provides the AC connection point for the for 57 Vdc Rectifier Module Slot 3.
7	Rectifier control connector	24 pin-terminal block	Provides the connection point for the WCS.
8	AC Input (IEC 60320 C19)	Power connector	Provides the AC connection point for the for 12 Vdc Rectifier Module Slot 2.
9	AC Input (IEC 60320 C19)	Power connector	Provides the AC connection point for the for 12 Vdc Rectifier Module Slot 1.
10	12Vdc Output	Power terminal	Provides the connection point for the Positive (Red Wire).
11	GND Output	Power terminal	Provides the connection point for the RTN Negative (Black Wire).

12 Vdc Rectifier Module

The 12 Vdc Rectifier Module (PN 7663610-xx) supplies power to the WCS and e-POI Subracks. The 12 Vdc Rectifier Module is fully redundant for ERA.

The PSU Rectifier Modules are hot swappable; you do not need to power down the PSU subrack to add or remove a module.

A second 12 Vdc Rectifier Module is to provide N+1 redundancy. The following graphic and table identify the 12 Vdc Rectifier Module LEDs and connectors.



Ref #	LED	LED Color	Description
1	AC	Green	AC input is within the specified range of 85 to 264 Vac.
		Off	AC input is not within the specified range.
2	DC	Green	DC output is within the specified range of 12V+/-2% (worst case) over line, load, and temperature.
		Off	DC output is not within the specified range.
3	FLT (Fault)	Red	There is no AC input or a failure has been detected in the 12 Vdc Rectifier Module. The Fault LED activates under the following conditions: • If two 12 Vdc Rectifier Modules are installed in the PSU, and the AC input is removed (cable unplugged) from one of the modules. • If only one 12 Vdc Rectifier Module is installed in the PSU, and AC power is removed. In this instance the FLT LED is only momentarily red. (The PSU has significant energy storage capacity and takes several seconds to fully discharge when AC input power is lost, which allows the FLT LED to remain on for a short period after input power is disconnected.)

For assistance in determining power consumption and heat produced for a specific equipment configuration contact CMS Global Technical Support as described on page 81.

The 12 Vdc Rectifier Module has an operating temperature range of -10 to +55 °C (+14 to +131 °F).

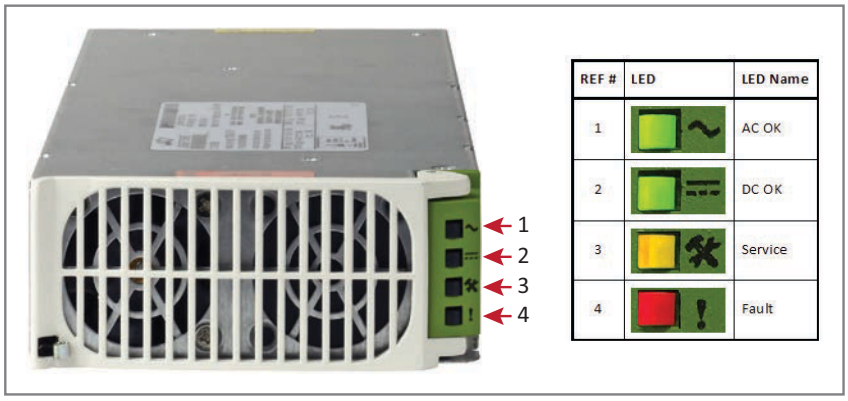
57 Vdc Power Rectifier Module

The 57 Vdc Rectifier Module (PN 7663468-xx) supplies Power over Cat6A to UAPs, Copper CAP Ls, and connected devices.

The PSU Rectifier Modules are hot swappable; you do not need to power down the PSU subrack to add or remove a module.

- Fiber APs and CAP Ls with local DC do not require 57 Vdc Rectifier Module support.
- A 57 Vdc Rectifier Module is not required
  - if the CAN/TEN will not be powering APs
  - for Switching CANs or WINs.
- The 57 Vdc Rectifier Module has an operating temperature range of -10 to +55 °C (+14 to +131 °F).

57 Vdc Power Rectifier LEDS



Condition	AC OK	DC OK	Service	Fault
Unit is functioning to specification.	On	On	Off	Off
Thermal shutdown; ambient temperatures over the operating range of 55°C (131°F) triggers the shutdown.	On	On	On	Off
Defective fan, blown AC fuse in Power Module, boost stage failure, over voltage latched shutdown.	On	Off	Off	On
No AC <15 ms (single unit)	Off	On	Off	Off
AC present but not within limits of 85 to 264 Vac.	Blinks	Off	Off	Off
AC not present	Off	Off	Off	Off
Over current	On	Blinks	Off	Off
Non-catastrophic internal failure (any detectable fault that does not shut down the unit)	On	On	Off	On
Internal communications to a specific PSU module is lost.	On	On	Off	Blinks

Maximum Number of APs that can be Powered by WCS Subrack

This section shows how to calculate the maximum number of UAPs or Copper CAP Ls that can be powered for specific WCS Subrack configurations. Note: -48Vdc WCS Subracks ID 7844067-xx, 7844068-xx do not provide Power over CAT6A to support UAPs or Copper CAP Ls.

The number of UAPs or Copper CAP Ls supported by a WCS Subrack is dependent on several factors:

- the WCS Subrack ID
  - original version
    - 7635442-00 (WCS-4)
    - 76355443-00 (WCS-2)
  - current version
    - 7635442-01 (WCS-4)
    - 7635443-01 (WCS-2).
- the number of 57V Rectifier Modules installed in the PSU—one or two
- the electrical service voltage that powers the rectifiers —220 Vac or 120 Vac.
- the CAT Card version —7633228-01 or 7633228-02

The following subsections provide the information you need to apply these factors against installation parameters.

ERA Software Power Estimates

The ERA software uses the power estimates shown in Table 4 to determine the number of UAPs or Copper CAP Ls that can be powered via Power over CAT6A for a specific configuration.

Table 4. *Software Assigned AP Power Consumption*

AP/Device	Software-Assigned Power Consumption (Watts)
UAP	85
CAP L	125
1 Gb Ethernet device	35

CAT Cards

Table 5 defines the number of UAPs and Copper CAP Ls that the original version CAT Card (7633228-01) and the current version CAT Card (7633228-02) can power.

Table 5. *Number of APs that can be powered per CAT Card by version*

CAT Card ID	UAPs	CAP Ls (Without 1G Devices)	CAP Ls [1] (Including Cascaded Secondary CAP Ls)	CAP Ls (With 1G Devices)
7633228-01	6	4	8	3
7633228-02	8	4	8	4
1 One locally powered secondary CAP L can be connected to each primary CAP L in cascade mode. Secondary CAP Ls in a cascade do not draw power from the WCS. Cascaded APs do not support 1G devices.				

WCS Subracks, 57 Vdc Rectifier Modules, and Service Voltage

Table 6 and Table 7 list the number of UAPs and Copper CAP Ls that can be powered via Power over CAT6A based on the number of 57 Vdc Rectifier Modules and the electrical service voltage. These number of APs supported as listed in these tables assumes that the power consumption of the UAPs is the maximum 85 Watts and the power consumption of the CAP Ls is the maximum 125 Watts. Typical configurations may require less power per AP.

- Table 6 lists the number of UAPs and Copper CAP Ls that the **original** version of WCS Subracks can power via Power over CAT6A:
  - 7635442-00 (WCS-4)
  - 76355443-00 (WCS-2).
- Table 7 lists the increased number of UAPs and Copper CAP Ls that the **current** version of WCS Subracks can power via Power over CAT6A:
  - 7635442-01 (WCS-4)
  - 7635443-01 (WCS-2).

Table 6. *Number of UAPs and Copper CAP Ls powered by the Original Version WCS Subracks (7635442-00/7635443-00)*

AP Type	1 x 120 Vac		2 x 120 Vac		1 x 220 Vac		2 x 220 Vac	
	# APs Powered	Maximum Watts	# APs Powered	Maximum Watts	# APs Powered	Maximum Watts	# APs Powered	Maximum Watts
UAPs [1]	14	1200	24	2400	23	2000	24	4000
CAP Ls [1]	9[2]	1200	16[2]	2400	16[2]	2000	16[2]	4000

1 The number for supported APs does not include any connected 1G devices, which are also powered by the Power over CAT6A circuits. If these devices are used, they must be accounted for in the total power consumption calculations. See Table 4 on page 36.

2 One locally powered secondary CAP L can be connected to each primary CAP L in cascade mode for a total of 18 CAP Ls with one 120 Vac/57Vdc rectifier or 32 CAP Ls for all other rectifier configurations shown. Cascaded APs do not support 1G devices.

Table 7. *Number of UAPs and Copper CAP Ls powered by the Current Version WCS Subracks (7635442-01/7635443-01)*

AP Type	1 x 120 Vac		2 x 120 Vac		1 x 220 Vac		2 x 220 Vac	
	# APs Powered	Maximum Watts	# APs Powered	Maximum Watts	# APs Powered	Maximum Watts	# APs Powered	Maximum Watts
UAPs [1]	14	1200	28	2400	23	2000	32	4000
CAP Ls [1]	9[2]	1200	16[2]	2400	16 [2]	2000	16 [2]	4000

1 The number for supported APs does not include any connected 1G devices, which are also powered by the Power over CAT6A circuits. If these devices are used, they must be accounted for in the total power consumption calculations. See Table 4 on page 36.

2 One locally powered secondary CAP L can be connected to each primary CAP L in cascade mode for a total of 18 CAP Ls with one 120 Vac/57Vdc rectifier or 32 CAP Ls for all other rectifier configurations shown. Cascaded APs do not support 1G devices.

APs in a Mixed Copper CAP L and UAP System

The following tables provide examples of the number of CAP Ls and UAPs that a system with two 57Vdc rectifiers can support with **original** WCS and CAT Card versions and a system with **current** WCS and CAT Card versions. Please see Table 6and Table 7 on page 37 for the number of APs supported with a single 57Vdc PSU rectifier module.

The original version WCS-4 (7635442-00) and WCS-2 (7635443-00) subracks with four original version CAT Cards (7633228-01) support the following

Table 8. *Original version WCS Subrack with Original Version CAT Cards (2x 57Vdc PSU)*

AP Type	CAP Ls (Without 1G Devices)	CAP Ls (Including Cascaded Secondary CAP Ls)	CAP Ls (With 1G Devices)	UAPs
4 CAT Cards for CAP Ls 0 CAT Cards for UAPs	16	32	12	0
3 CAT Cards for CAP Ls 1 CAT Card for UAPs	12	24	9	6
2 CAT Cards for CAP Ls 2 CAT Cards for UAPs	8	16	6	12
1 CAT Cards for CAP Ls 3 CAT Cards for UAPs	4	8	3	18
0 CAT Cards for CAP Ls 4 CAT Cards for UAPs	0	0	0	24
One locally powered secondary CAP L can be connected to each primary CAP L in cascade mode. Secondary CAP Ls in a cascade do not draw power from the WCS. Cascaded APs do not support 1G devices.				

The current version WCS-4 and WCS-2 subracks and current version CAT Cards have been optimized to support additional UAPs and CAP Ls. A WCS-4 (7635442-01) or WCS-2 (7635443-01) subrack with four (7633228-02) CAT Cards supports the following:

Table 9. *Current version WCS Subrack with Current Version CAT Cards (2x 57Vdc PSU)*

AP Type	CAP Ls (Without 1G Devices)	CAP Ls [1] (Including Cascaded Secondary CAP Ls)	CAP Ls (With 1G Devices)	UAPs
4 CAT Cards for CAP Ls 0 CAT Cards for UAPs	16	32	16 [2]	0
3 CAT Cards for CAP Ls 1 CAT Card for UAPs	12	24	12	8
2 CAT Cards for CAP Ls 2 CAT Cards for UAPs	8	16	8	16
1 CAT Cards for CAP Ls 3 CAT Cards for UAPs	4	8	4	24
0 CAT Cards for CAP Ls 4 CAT Cards for UAPs	0	0	0	32 [3]

1 One locally powered secondary CAP L can be connected to each primary CAP L in cascade mode. Secondary CAP Ls in a cascade do not draw power from the WCS. Cascaded APs do not support 1G devices.

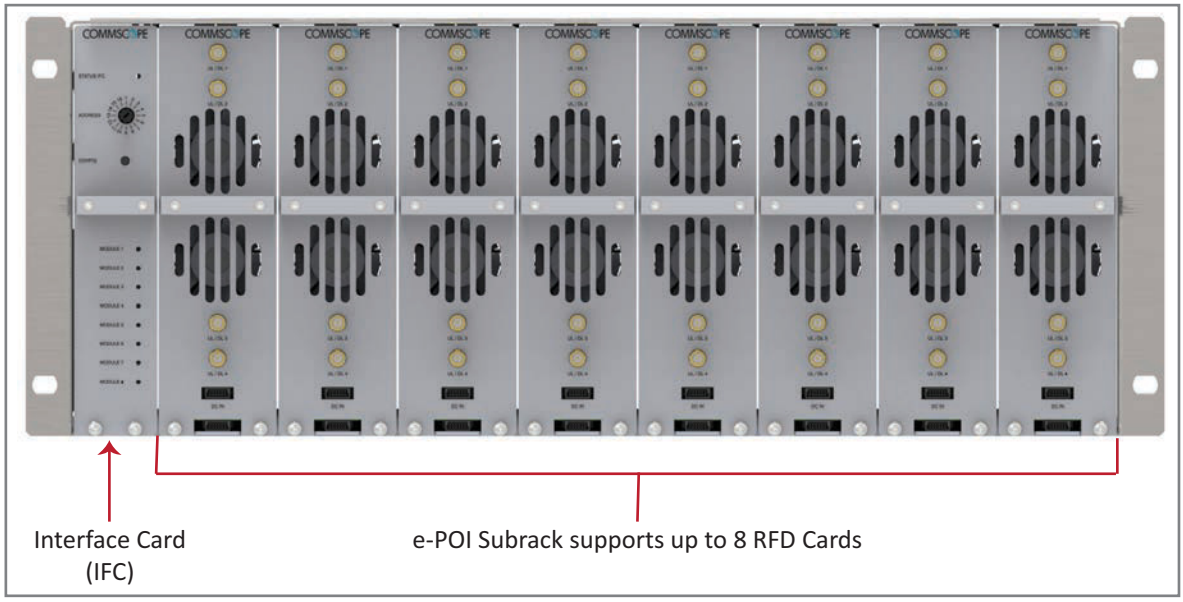
2 Maximum number of CAP Ls with 1G devices is limited to 15 with 2x 57Vdc/**120Vac** PSU. (Capable of 16 with 2x 57Vdc/**220Vac** PSU.)

3 Maximum number of UAPs is limited to 28 with 2x 57Vdc/**120Vac** PSU. (Capable of 32 with 2x 57Vdc/**220Vac** PSU.)

Optional e-POI Subracks

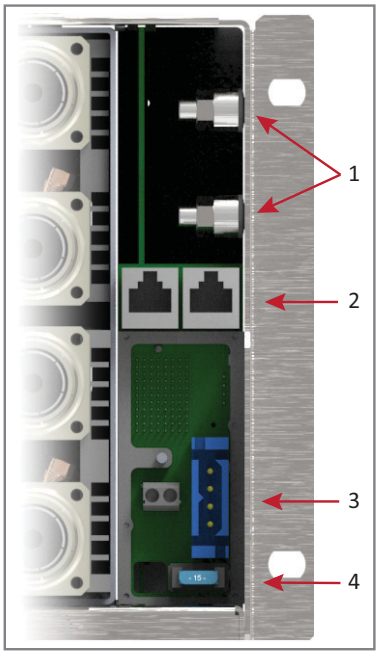
This section provides a product overview and installation instructions for the optional ERA Series Point of Interface (e-POI) Subrack (PN 7676311-xx). You use an e-POI Subrack to attenuate high-power RF signals from their source to the CAN, across all frequencies.

The universal e-POI Subrack provides power, housing, and communications for up to eight e-POI Modules. The e-POI Subrack ships with the Interface Card (IFC) factory installed. The e-POI Subrack and the Interface Card and e-POI Module have an operating temperature range of -5 to +50 °C (+23 to +122 °F).



To maximize airflow through the e-POI chassis, blank modules must be installed in all empty slots. If additional ERA e-POI Blank Modules (PN 7673474-xx) are required, contact your local CommScope sales representative.

The following graphic and table identify the e-POI Subrack back-panel connectors.

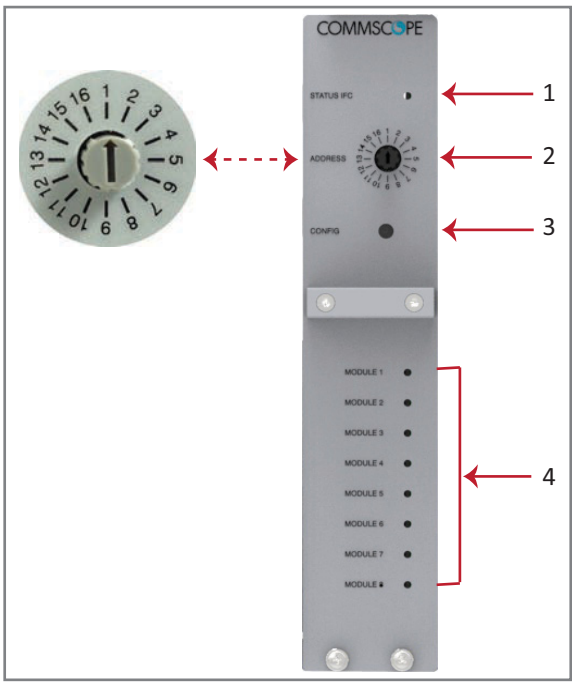


Ref #	Component	Device	Function
1	Ground studs	Ground studs	Provides grounding for the e-POI Subrack.
2	Communication ports	RJ-45 jack (female)	Communication ports that connect to the WCS-2 or WCS-4 Subrack.
3	12 Vdc Input connector	4-pin power terminal	Power terminal that connects to the WCS-2 or WCS-4 Subrack.
4	15A Blade Fuse		

Interface Card (IFC)

The IFC (PN 7676260-xx) is used to set the Subrack number of the e-POI Subrack. It also provides communications, status, and alarms for the e-POI Modules installed in the e-POI Subrack.

The following graphic and table identify the IFC Card LEDs and connectors.



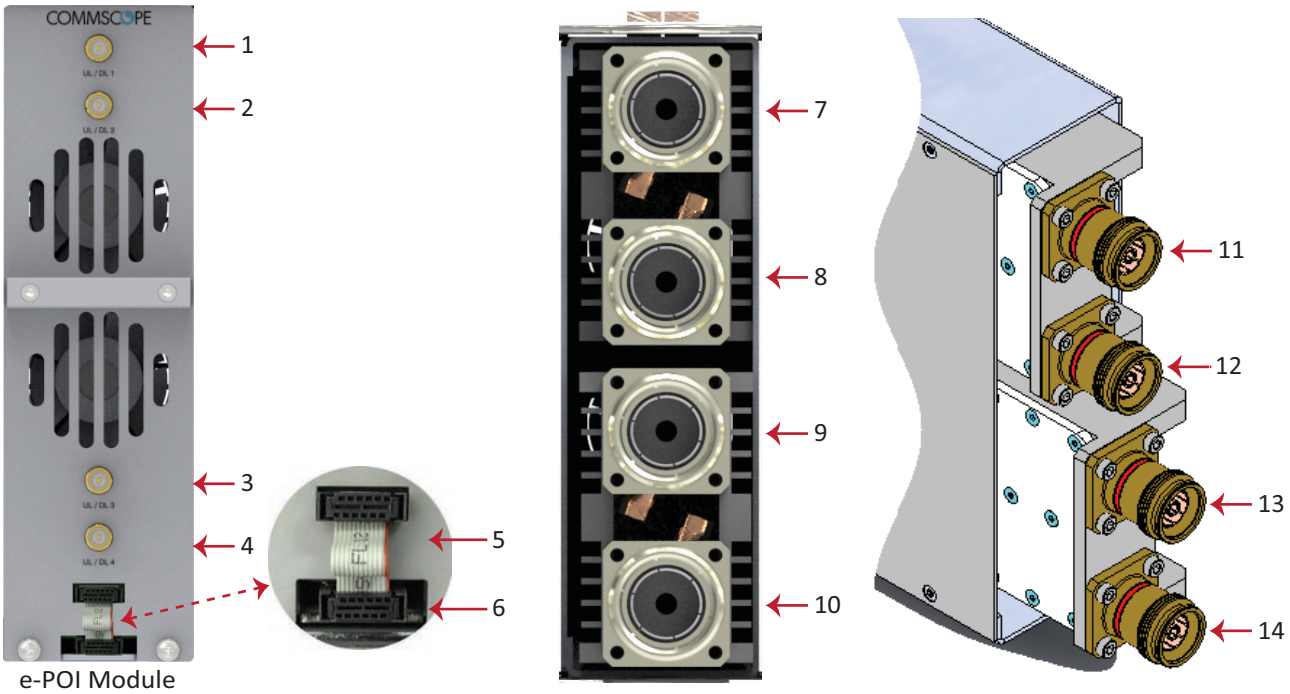
IFC LEDs			
Ref #	**LED**	**LED Color**	**Description**
1	Status	• Off	• The e-POI Subrack or the IFC is not fully seated or is not receiving power.
		• Green	• e-POI Subrack or IFC is functioning to specification.
		• Red	• Active alarm on e-POI Subrack or IFC.
4	e-POI Module Status 1 - 8	• Off	• e-POI Module in corresponding slot is not receiving power.
		• Green	• e-POI Module in corresponding slot is functioning to specification. e-POI Module Status LED must be green before connecting corresponding RF signals to input. **NOTE: If e-POI Module is not functioning, PIM or VSWR rating could be compromised, causing an alarm on the BTS.**
		• Red	• e-POI Module in corresponding slot has active temperature alarm.

IFC Connectors			
Ref #	**Component**	**Device**	**Function**
2	Address switch	Rotary dial	Must be set to **1**.
3	Config button	Pushbutton	Alerts ERA Software to scan for and remove references to removed RFD Cards; see "Removing an e-POI Module from an e-POI Subrack" on page 79.

e-POI Modules

The e-POI Modules provide a wide-band, high power, low-PIM, interface and attenuation for the ERA RFD Cards. Each e-POI Module can handle all frequency bands as well as multiple operators. Each e-POI Module has four duplexed ports that supply support for up to four interfaces. e-POI modules are hot swappable; you do not need to power down the e-POI subrack to add or remove them. However, there are steps you should take to avoid false alarms; please see "Removing an e-POI Module from an e-POI Subrack" on page 79.

The following graphic and table identify the e-POI Module connectors.



e-POI Module Front Panel

Two versions of the e-POI Module Back Panel

Ref #	Component	Device	Function
1	UL/DL Port 1	Female QMA connector	Connect to Ports 1 - 4 on an RFD Card in the CAN.
2	UL/DL Port 2		
3	UL/DL Port 3		
4	UL/DL Port 4		
5	Module Power/Com port	4-pin power connector	Use the Ribbon cable [1] (PN 7671957-xx) to connect the Module Power port to the Subrack Power/Com port.
6	e-POI Subrack Power/Com port	4-pin power connector	Connects to DC on a 12 Vdc Rectifier Module in the WCS Subrack.
7	UL/DL Port 1	7/16 DIN connectors (e-POI Module PN 7659180-00)[2]	Connect to the eNodeB.
8	UL/DL Port 2		
9	UL/DL Port 3		
10	UL/DL Port 4		
11	UL/DL Port 1	4.3-10 connectors (e-POI Module PN 7761433-00)	Connect to the eNodeB.
12	UL/DL Port 2		
13	UL/DL Port 3		
14	UL/DL Port 4		

1 The Ribbon cable is connected after the e-POI Module is installed in the e-POI Subrack.
2 The e-POI Module 7659180-00 is no longer being manufactured, it is included here for those ERA systems in which this version of the e-POI Module is installed and deployed at customer sites.

Safely Working with ERA Hardware

The following sections provide important information that you should read and know before working with any ERA hardware. Observe all cautions and warnings listed in this section.

Health and Safety Precautions

A high leakage current ground (earth) connection to the Power Supply Unit (PSU) is essential before making any other connections to the PSU.

Laser radiation. Risk of eye injury in operation. Do not stare into the laser beam; do not view the laser beam directly or with optical instruments.

High frequency radiation in operation. Risk of health hazards associated with radiation from the antenna(s) connected to the unit. Implement prevention measures to avoid the possibility of close proximity to the antenna(s) while in operation.

Property Damage Warnings

Keep operating instructions within easy reach and make them available to all users.

Only license holders for the respective frequency range are allowed to operate this unit.

Read and obey all the warning labels attached to the unit. Keep all warning labels are kept in a legible condition. Replace missing or damaged labels.

Make sure the unit's settings are correct for the intended use (refer to the manufacturer product information) and regulatory requirements are met. Do not carry out any modifications or fit any spare parts, which are not sold or recommended by the manufacturer.