

# Fiber Smart NETWORKS



## Hardware Installation Manual

DOC-0002

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The limited warranty for the accompanying product is set forth in the Wave2Wave ROME product warranty and is incorporated herein by this reference. If you are unable to locate the limited warranty, contact your Wave2Wave Solution representative for a copy.

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# 1 Introduction

## 1.1 About This Document

This guide provides step by step instructions for the installation of the Wave2Wave Robotic Optical Management Engine (ROME) system, as well as important information on Standards, Agency193 Approvals, and Safety warnings. Please read all the safety warnings before beginning installation.

## 1.2 Audience

This document is intended for technicians that install ROME.

## 1.3 Safety Warnings



### Disposal: Separate Collection in European Countries

The following apply only to users in European countries:  
This product is designated for separate collection at an appropriate collection point. Do not dispose of as household waste.

*To avoid the potentially damaging effects on the environment and human health as a result of the presence of hazardous substances in electrical and electronic equipment, end users of electrical and electronic equipment should understand the meaning of the crossed-out wheeled bin symbol. Do not dispose of WEEE as unsorted municipal waste and have to collect such WEEE separately. This symbol indicates that this product is to be collected separately. For more information, contact the retailer or the local authorities in charge of waste management.*



### Rack Certification

To ensure safety, all configurations of the rack cabinet must be certified by a nationally recognized testing laboratory in order to verify compliance with country-specific safety regulations. This process ensures that the end product remains safe for the operator and service personnel under normal and foreseeable misuse conditions.



### Heavy Equipment

Due to the heavy, 165 lbs (75 kg), weight of the ROME Chassis and also to its slide out capability, it is important that care is taken in lifting and mounting ROME to a rack. To prevent bodily injury or damage to the chassis:

1. Never attempt to lift or tilt the chassis without the use of a mechanical lifting device, such as the one pictured. The lifter should support at least 100 kg.
2. Take special precautions to ensure that the system remains stable.
  - a. The rack used to mount the ROME must be properly anchored to the floor.
  - b. If the ROME unit is the only unit in the rack, it should be mounted near the bottom of the rack (while still allowing bottom clearance).
  - c. When mounting this unit in a partially filled rack, when possible, load the rack from the bottom to the top with the heaviest component at the bottom of the rack.
  - d. To enable maintenance, the ROME Chassis should be installed to allow 12 inches of clearance above and below the chassis when fully extended on the slider.
  - e. If the rack is provided with stabilizing devices, install the stabilizers before mounting or servicing the unit in the rack.





### Electrical Current

Electrical current from power, telephone, and communication cables is hazardous.

1. Do not connect or disconnect any power cables or perform installation, maintenance, or reconfiguration of this product during an electrical storm.
2. This apparatus must be properly grounded with a protective earth contact.
3. The device is intended for use when supplied with power from a supply providing 100-240 V max; 50/60 Hz 4A per input, -48/-60 Vdc, 8A per input.
4. Power is provided to the ROME chassis by the LCU via the RCU cable. (270 Vac RMS max; 39 kHz; 0.5A max; 12Vdc; 3A=Powered by LCU.)
5. Disconnect power (following proper shutdown procedures), telecommunications systems, networks, and modems before you open the device covers. Remove all jewelry (including rings, necklaces, and watches), wear a grounding wrist strap, and do not directly touch the backplane with your hand or any metal tool, to avoid possible shocks, burns, or ESD damage to the unit.
6. Never turn on any equipment when there is evidence of fire, water, or structural damage.
7. DO NOT OPEN ROME Unit when power is on. Hazardous voltages exist within the unit as well as moving parts that may cause injury. This product contains no user-serviceable parts. The unit may be opened ONLY by trained and qualified personnel.



### Proper Grounding Required

This equipment must be grounded. Never defeat the ground conductor or operate the equipment in the absence of a suitably installed ground conductor. Contact the appropriate electrical inspection authority or an electrician if you are uncertain that suitable grounding is available. When installing or replacing the unit, the ground connection must always be made first and disconnected last.



### Avoiding Circuit Overload

Overloading a circuit is potentially a fire hazard and a shock hazard under certain conditions. To avoid these hazards:

1. Take care when connecting units to the supply circuit so that wiring is not overloaded.
2. Ensure that your system's electrical requirements do not exceed the branch circuit protections requirements. Refer to ROME's electrical specifications.
3. An over current protection device (15A branch circuit breaker) should be incorporated into the building installation.



### Possible Laser Hazard

This device can switch laser based source signals, which, at higher wattage levels, require additional precautions by the user. Since it is the user that determines what signals are transmitted through this device, and not the device manufacturer, it is the responsibility of the user to take the necessary precautions as dictated by the source equipment generating the signals in question. It is recommended that the user add any warning labels to this device, as necessary, in the case of higher level laser sources that may be potentially harmful if exposed to the user.



### Extending Devices Forward in Rack

Do not extend more than one sliding device at a time.



### Caution

This unit has more than one power supply cord. Disconnect power supply cords before servicing to avoid electric shock.

The products were tested in a branch circuit protected by a 20 A circuit breaker (AC Input) and 32 A (DC Input). Additional evaluation shall be conducted if a higher protector is to be used in the end system.

The mains supply cord set used to connect the equipment to supply mains must be of an approved type acceptable to the authorities in the country where the equipment is sold.

The plug on the power supply cord is intended to serve as the disconnect device, the socket-outlet shall be installed near the equipment and shall be easily accessible.

## 2 Pre-Installation

Once the ROME unit and the hardware is ready to be installed into rack. Remove the ROME slider rails from the kit and adjust the slider rails to a minimum of 29" which is the required depth needed for proper installation of ROME chassis, to a maximum of 46 inches. Each kit includes the following:

### 2.1 Parts List

2 ROME slider rail units for mounting ROME Chassis:

- Each slider rail unit is comprised of a rear bracket, front bracket, stiffener, slider, 6 socket head cap screws.
- Each slider rail unit comes pre-assembled, but with loose screws to allow for adjustment.
- Two people are required to mount slider. Each slider assembly weighs 21 lbs.



1 Set of ROME Positioning Rulers (2 each for WECCO and EIA racks):



1 Clearance/Level Tool (Jig) to ensure proper clearance and leveling of ROME chassis for proper installation:



## 2.2 Rack Planning

When planning rack configuration, remember to allocate 1RU space in the rack for the LCU. The LCU may be installed in any location within the rack, including directly above the ROME.



Best Practice

If installing ROME in a populated rack, install ROME in the lowest available space on the rack.



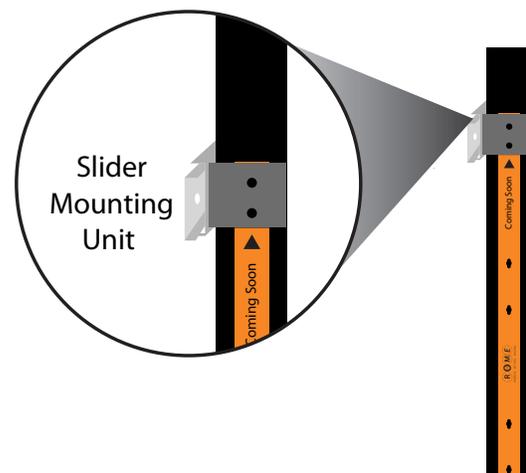
Best Practice

The ROME Chassis uses non-forced air cooling. When installing the ROME Chassis in a rack with OEM electronic equipment we recommend that the OEM equipment be installed above the ROME Chassis and LCU. This helps to reduce or limit the transfer of heat from other equipment via the bottom of the ROME Chassis.

## 2.3 Installing Slider Rail Units

Follow the steps below to install the ROME slider rail units on a four post rack. Prior to continuing, please make absolutely sure that the safety guidelines from section 1.3.2 (“Heavy Equipment”) have been followed correctly.

1. Place the ROME positioning ruler on the rack rail. The lower end of the ruler should be 12 inches from the rack floor. It is recommended that the slider be adjusted to the required depth prior to mounting the slider. Screws may need to be removed to adjust the brackets to the required depth. Two types of rulers are provided for EIA and WECC racks.

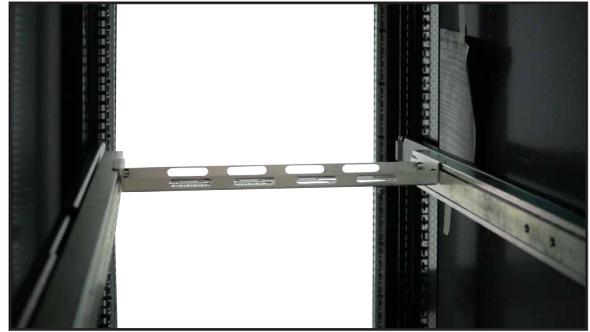


2. Place one slider rail unit above the arrow on the ruler and secure the front side of the slider rail unit to the front rail.

3. Secure the back side of the slider rail unit to the back post, use a level to make sure the slider rail unit is level.
4. Tighten the slider brackets screws to the slider body and stiffener.
5. Repeat steps 1-4 for the opposite side of the rack with the second slider rail unit.
6. Clearance/Level Testing
  - Extend the sliders arms all the way out through the front of the rack
  - Use the jig by placing it on the 2 extended slider arms
    - a. Check right to left leveling using a level, adjust sliders front brackets as needed.
    - b. Run the jig between the 2 sliders from the front of the rack to the back to check for clearance.
    - c. When the jig is in the back, check the level again. Adjust back screws if needed.



Jig in Front of Rack



Jig in Back of Rack

7. Installing additional set of sliders (if applicable)
  - Install the ROME positioning ruler, where the lower end should be on top of the installed slider
  - Repeat steps 2 to 6

*Note:* There is a 12 inch clearance from the bottom of the rack.



## 3 Preparing ROME

### 3.1 Installation Preparation

Before beginning the installation of ROME equipment, please make sure to:

- ⚠ • Wear an ESD strap.
- Have a mechanical lifting device available, such as the one pictured, which is required to lift and maneuver the heavy, 87 kg (191.8lbs) ROME equipment, to avoid possible bodily injury.



### 3.2 Unpacking ROME

#### Steps

1. Visually inspect the package to ensure it has arrived undamaged.



2. Identify the 2 shock watch indicators on the outside of the package and make sure they're not activated (red). If either indicator is red, stop the process and contact Wave2Wave.



3. Unpack the box.

4. After the box is unpacked, inspect the internal shock watch indicator and all elements of the unit for damage. If either the indicator is activated or if there is any damage to the ROME equipment, please do not proceed with installation and contact Wave2Wave.



## 4 Installing the ROME Chassis

Installing the ROME Chassis involves the following steps:

1. Mounting the ROME Chassis
2. Mounting the patch panel
3. Cabling (fiber and ground)

*Note:* Configuring the ROME equipment is covered in the ROME Administrator Manual.

**Option 1:** You will need a total of 20 RUs to properly install ROME chassis, LCU and fiber patch panel in front of rack.

**Option 2:** You will need a total of 11 RUs to properly install the ROME chassis and LCU in front of the rack and a total of 9U's to install the fiber patch panel behind the ROME chassis.

### 4.1 Mounting the ROME Chassis

Orient the front of the ROME Chassis based on configuration.



Best Practice

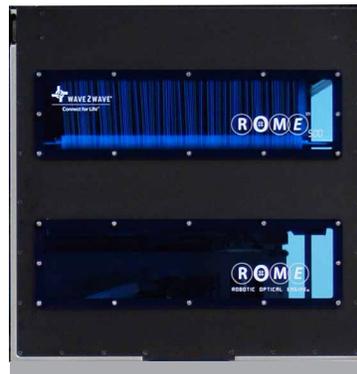
Take special precautions to ensure that the system remains stable. In particular, mount the first ROME unit on the lowest set of sliders. Continue to mount ROME units from the bottom up. Two people are recommended for this step of the process.

1. Move the ROME Chassis to the lift.
2. Position the ROME unit with the front panel on the the lift (Provide enough room to mount sliders).
3. Route the patch panel through the rack and leave it on the other side of the rack.
4. Extend (slide-out) the sliders arms to maximum extension.
5. Raise the ROME carefully and place it at the appropriate height in between the sliders.
6. Align the extended arms of the sliders with the ROME mounting brackets located on the left and right side at the top of the ROME.
7. Securely attach the slider arms to the ROME mounting brackets using the supplied screws (do not use washers or nuts). Attach the chassis with six (6) phillips head screws on each side. All six (6) screws should be used for proper support of the ROME chassis slider rail units.



Lifting ROME into Position

8. Once the chassis is securely attached to the slider bracket system, the lift can be removed.
9. It is optional to remove the protective bottom plate that has been protecting the underside of ROME during the installation process. Please be sure to store plate for future relocation. The plate can be removed by unscrewing the 4 bolts at each corner of plate (Allen #6).



← Protective Bottom Plate

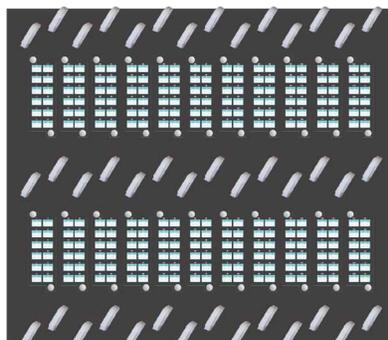
10. Slide the ROME Chassis into the rack.
11. Secure the ROME to the front rack screwing the ears to the rack.

## 4.2 Mounting the Patch Panel

Sufficient cable length is provided to mount the patch panel in the front or rear of the four post rack. Once the ROME Chassis has been fully installed in the rack, the patch panel can be secured to the rack.

The patch panel is pre-connected to ROME with a fiber cable and can be secured to the rack after the ROME Chassis is secured to the rack.

To install the patch panel, secure it to the posts of the rack using the mounting ears and screws.



Patch Panel

### 4.3 Cabling (Fiber and Ground)

#### 4.3.1 Organizing the Fiber Cable



Best Practice

The slack fiber cable from the ROME Chassis should be spooled and secured to the rear of the patch panel. Sufficient slack should be allowed to fully extend the ROME Chassis outwards for maintenance.

#### 4.3.2 Grounding the ROME Chassis

Connect the customer facility ground to the ROME Chassis at the attachment point which is located at the lower left corner when looking at the back of the ROME (refer to the pictures below).



Verify that the ground cables/wires are made of copper and that the facility ground cable is at least 10 AWG.



Rear Ground (Earth) Point



2-HOLE Compression Lug  
Attach using M5 16mm screws

## 5 Installing the LCU

Each ROME Chassis is controlled by an LCU. The LCU install kit includes the LCU, a signaling cable (Y-Cable) to attach to the ROME Chassis, and a ground cable. 1 RU of space above the LCU is recommended to allow adequate space for connecting the LCU control and ground cable.

Installing the LCU involves the following steps:

1. Mounting the LCU
2. Connecting Cables (signalling and ground)
3. Powering up ROME by plugging in both power cables

### 5.1 Mounting the LCU

The LCU mounting kit comes with two L-brackets (ears) which are attached to the front of the LCU chassis and extension brackets in the back that is mounted on the rear post to support the LCU chassis. To install the LCU, slide the LCU into position, and secure the brackets to the rack.



Best Practice

The LCU should be installed on top of the ROME Chassis.

### 5.2 Connecting Cables (Signaling and Grounding)

#### 5.2.1 Connecting the Signaling Y Cable

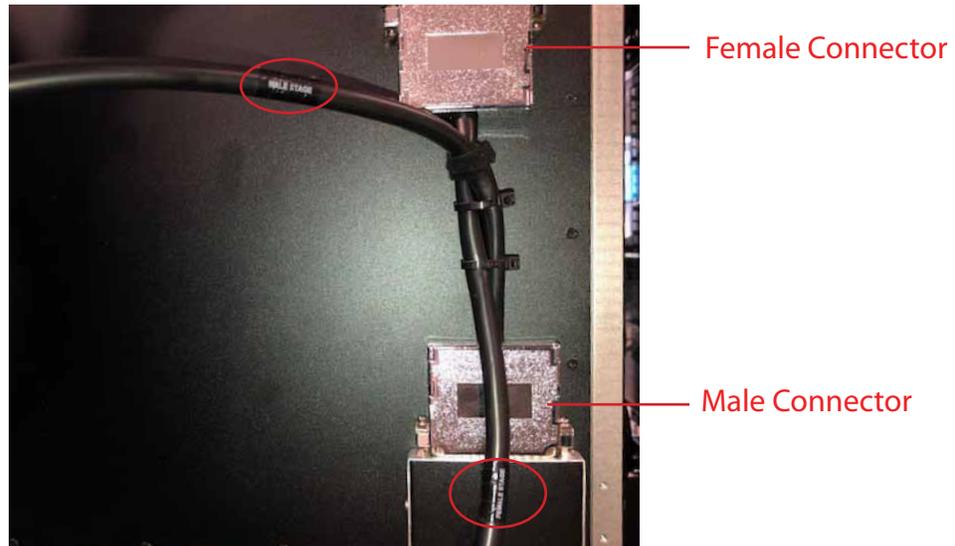
To connect the LCU to the ROME Chassis, the following steps should be taken:

1. Connect the ROME signaling Y cable to the LCU output



Backside of LCU with Signaling Y cable connected

2. Connect the cable to the back of the corresponding ROME Chassis  
The signaling cable from the LCU to the ROME Chassis should be tied down to the rack to organize the cable. When it is tied down properly, the cable should have enough slack to allow ROME Chassis to slide out for maintenance.



**Important:**

Be sure to insert Female Connector to the top signal box and Male Connector to the bottom signal box, using the provided labels on the signaling Y cable. If it is not connected correctly, ROME will not operate.



Best Practice

The signaling cable from the LCU to the ROME Chassis should be secured to the rack. Enough slack should be allow to fully extend the ROME Chassis out for maintenance.

**5.2.2 Grounding the LCU**

Connect the customer facility ground to the ROME LCU at the attachment point which is located at the left corner when looking at the back of the ROME LCU (refer to the picture below).



LCU Ground

2-Hole Compression Lug attached using M5 16mm screws

### 5.3 Powering Up ROME

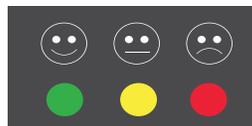
Once the ROME Chassis and LCU have been installed, connected through signaling Y cable, and properly grounded, the ROME equipment can be powered up.

The power cable connections are located on the front panel of the LCU.



Use provided 2 power cables (15P to C15, SJT 14AWG) and plug in to turn on the ROME. For other regions, different power cables may be provided.

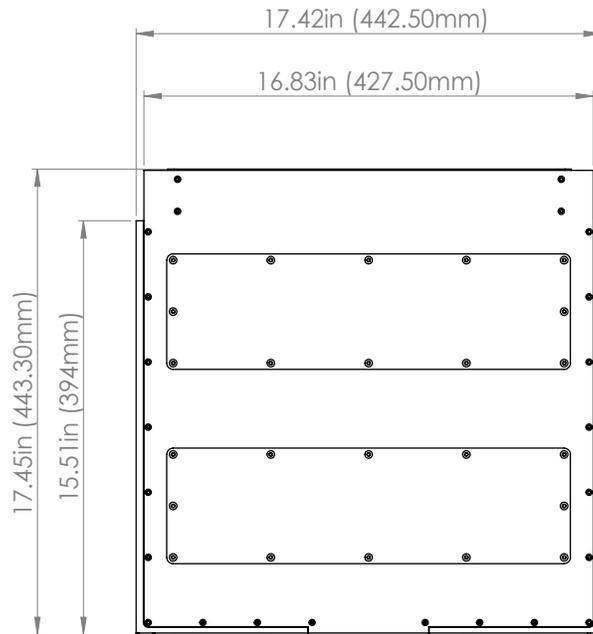
The LCU front panel has three LEDs. These LEDs provide a quick visual indication of the system's functional status.



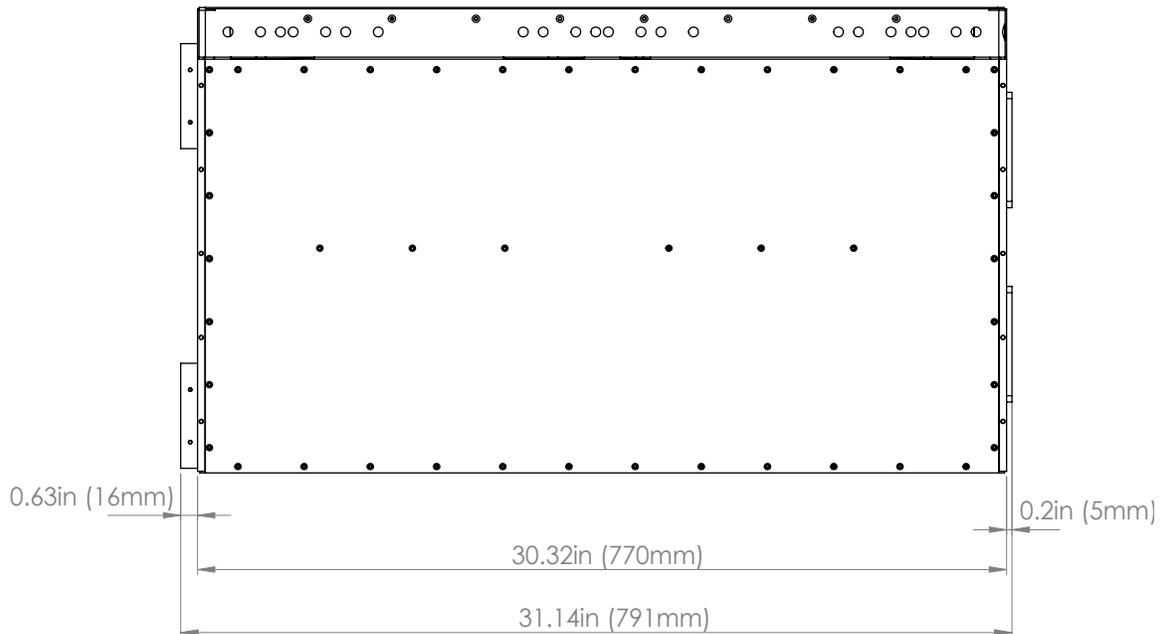
After power is connected to the both power supplies, ROME will go through a booting and homing sequence and when successful, only the green light will stay on.

The next step is to configure the ROME software and ROME users, which is covered in the ROME Administrator's Manual.

## Appendix 1 - ROME Dimensions

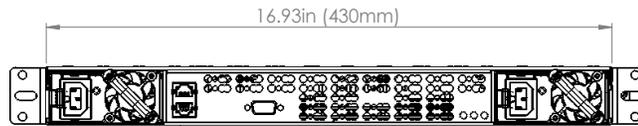


ROME - Front View Dimensional Details

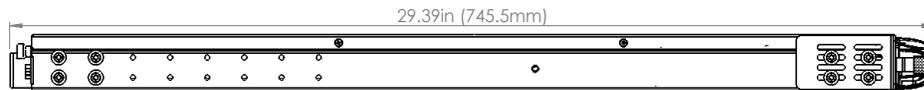


ROME - Side View Dimensional Details (mm)

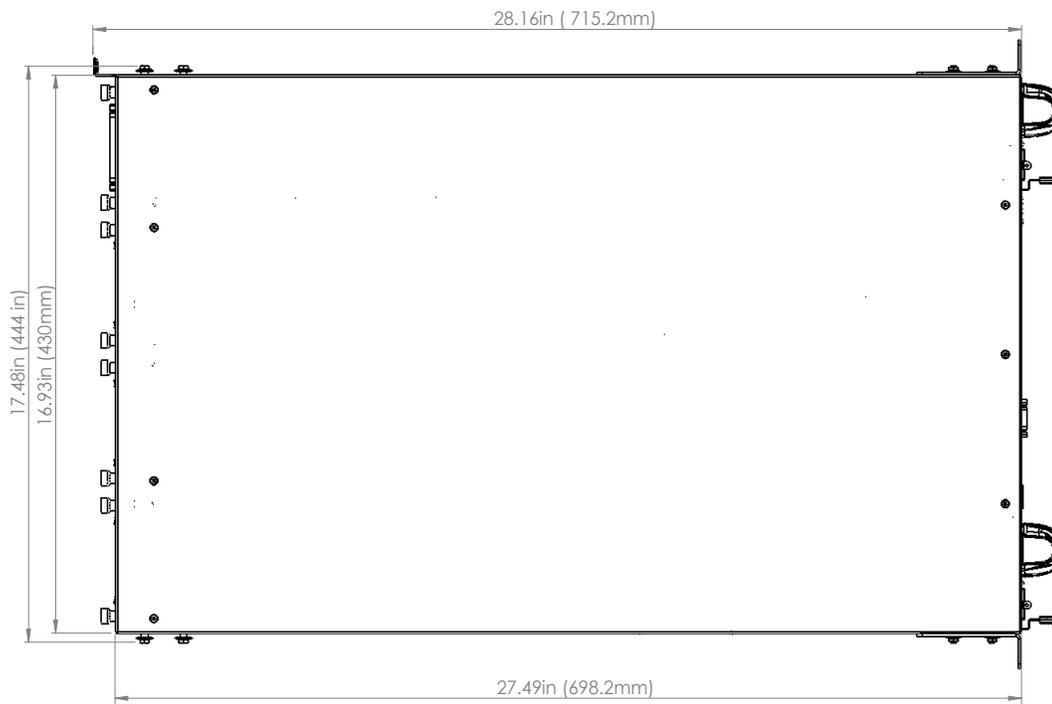
## Appendix 2 -LCU Dimensions



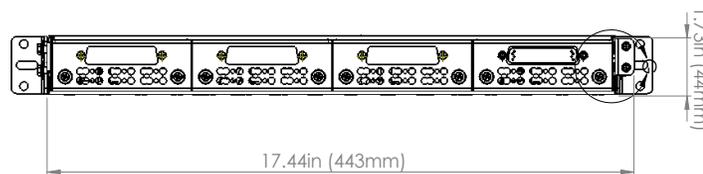
Front View



Side View

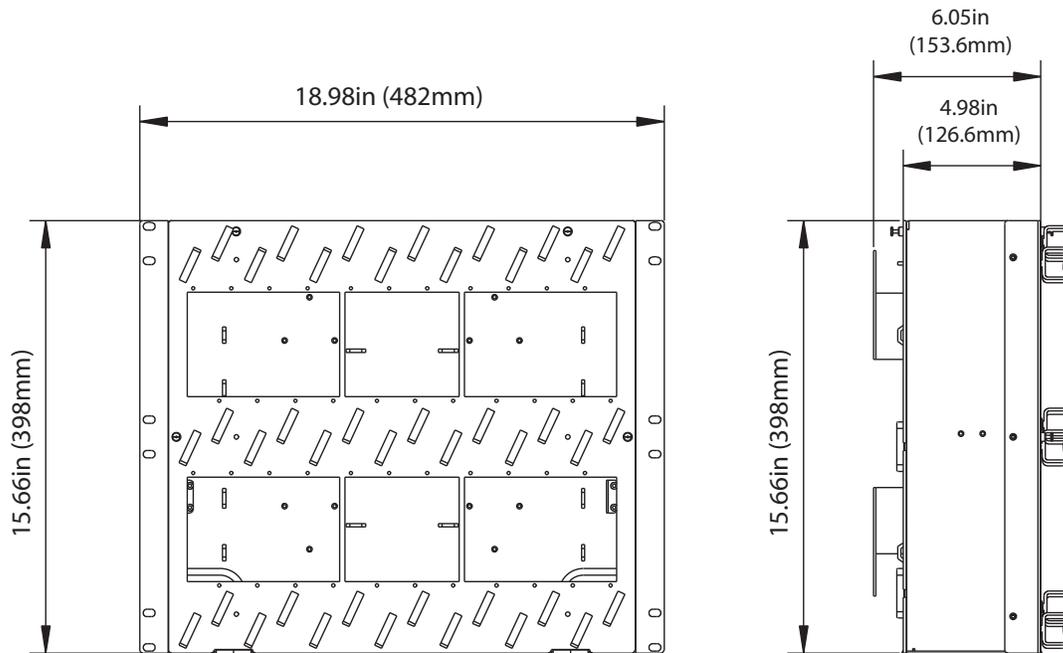


Top View



Rear View

## Appendix 3 - Patch Panel Dimensions



## Appendix 4 - Console Cable Pinout

Signals and Pinouts for the Console RJ-45 to DB-9 Serial Cable

Console Cable Pinout			
Console Port		PC COM Port	
RJ-45		DB-9	
Pins	Signals	Pins	Signals
1	-	-	-
2	-	-	-
3	-	-	-
4	GND	-	GND
5	TXD_RS232	3	RXD_RS232
6	RXD_RS232	2	TXD_RS232
7	-	-	-
8	-	-	-

## Appendix 5 - ROME Specifications

Specifications	ROME® 500	ROME® 64Q	ROME® 128Q
<b>Optical Characteristics</b>			
Fiber	512 Fibers	512 Fibers	1,024 Fibers
Configurations	<ul style="list-style-type: none"> <li>• Duplex Tandem Any to Any</li> <li>• Duplex Any East to Any West</li> <li>• Simplex Tandem Any East to Any West</li> </ul>	8 Fiber Any to Any	8 Fiber Any to Any
Fiber Type	Single Mode SMF-28e, Multi-mode OM4		
Patch Panel Interface	LC PC/UPC Duplex	MPO	
Insertion Loss	1.0 dB Max (0.5 dB Typical) Patch panel to patch panel		
Return Loss	Single Mode -50 dB UPC, -60 dB APC		
	Multi-mode -25 dB		
Switching Time	15 sec (Typical)		
<b>Power Requirements</b>			
Power Supply Options	AC+AC, DC+DC, or AC+DC Hot Swappable		
LCU Power Input	100-240 V; 50/60 Hz 4A per PSU, -48/-60 Vdc; 8A per PSU		
Power Consumption	55W Standby	150W (180W Peak) While Switching	
<b>Environmental Conditions</b>			
Temperature Range (operating)	0 °C to 40 °C (32 °F to 104 °F)		
Temperature Range (storage)	-40 °C to 70 °C (-40 °F to 158 °F)		
Relative Humidity (non-condensing)	5% to 95%		
<b>Mechanical Specifications for Main Chassis</b>			
Rack Unit	19" -10RU		
Dimensions	17.4" (442mm) Width, 17.5" (443mm) Height, 31" (791mm) Depth		
Mounting Depth	29" (737mm) to 36" (915mm)		
Weight	211 lbs (95kg)		
Patch Panel	9RU back to back with main chassis in 36" mounting depth		
<b>Mechanical Specifications for Logical Control Unit (LCU)</b>			
Rack Unit	19" -1RU		
Dimensions	17.5" (444mm) Width, 1.7" (44mm) Height, 27.5" (698mm) Depth		
Mounting Rail Distance	29" (737mm) to 36" (915mm)		
Weight	24 lbs (11kg)		
<b>Shipping Specifications</b>			
Dimensions	L40" x W24" x H46"		
Gross Weight	300 lbs (136kg)	344 lbs (156kg) with Sliders	
<b>Network Interfaces</b>	Ethernet: RJ45, Console: RJ45 and DB9		

## Standards Compliance

### Safety Compliance

- ANSI/UL 60950-1 / CSA 60950-1 (USA / Canada)
- EN60950-1 (Europe)
- IEC60950-1 (International), CB Certificate & Report Including All Group and Country Deviations
- Low Voltage Directive 2006/95/CE (Europe)

### EMC Compliance

- FCC /ICES-003 - Emissions (USA / Canada)
- CISPR 22/32 - Emissions (International)
- EN55022/32 - Emissions (Europe)
- EN55024 - Immunity (Europe)
- EN 300 386 - Emissions & Immunity (Europe)
- EN61000-3-2 - Harmonics (Europe)
- EN61000-3-3 - Voltage Flicker (Europe)
- EMC Directive 2004/108/EC (Europe)

### Additional Compliances

- CE Declaration of Conformity (Europe)
- FCC/ICES-003 Class A Verification Report (USA / Canada)
- RoHS Compliant
- Reach Compliant
- SFF-8431 Compliant
- In Process of Conflict Minerals Certification

## FCC Part 15 Notice

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions:

(1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

*Note:* This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case users will be required to correct the interference at their expense.

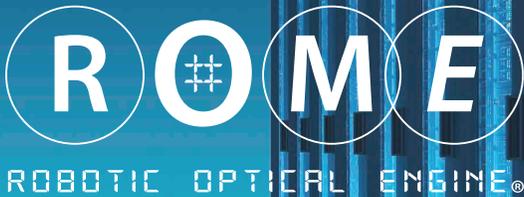
**Class A Product:** This is a class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

**Canada Class A:** This Class A digital apparatus complies with Canadian ICES-003. Cet appareil numérique de la classe "A" est conforme à la norme NMB-003 du Canada.

**VCCI Class A for Japan:** This is a Class A product based on the standard of the Voluntary Control Council for Interference by Information Technology Equipment (VCCI). If this equipment is used in a domestic environment, radio disturbance may arise. When such trouble occurs, the user may be required to take corrective actions.

# Fiber Smart NETWORKS

1RU (1.71in)



Innovate • Design • Manufacture

## Contact

### U.S. Headquarters

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