



**OpenWay® Riva™**

# **IRM-STAR and IRM-MESH Installation Guide**

IRM-STAR and IRM-MESH Installation Guide  
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# New in this Document

Revision	Date	Description
REV 001	January 3, 2024	<ul style="list-style-type: none"><li data-bbox="727 394 1466 457">■ Introduction Chapter - Updated a Caution regarding Ethernet cables. See <a href="#">Introduction on page 6</a>.</li><li data-bbox="727 464 1466 558">■ Accessories Chapter - Updated a number of sections related to the antennas and antenna kits. See <a href="#">Antennas and Antenna Kits on page 19</a>.</li><li data-bbox="727 564 1466 659">■ Star and Mesh Deployment Installation Chapter - Updated a Caution regarding Ethernet cables. See <a href="#">Star and Mesh Deployment Installation on page 24</a>.</li></ul>
REV 000	July 13, 2023	<ul style="list-style-type: none"><li data-bbox="727 701 919 722">■ New document.</li></ul>

# 1

## Introduction

This guide provides information about: Star and Mesh deployment installation, Radio Frequency (RF) installation, replacing an existing Industrial Router Module (IRM) with a new Industrial Router Module STAR (IRM-STAR), and Industrial Router Module MESH (IRM-MESH) in the field and RF Filter installation. This guide is designed for field installers who are familiar with the Cisco Industrial Router (IR8140), its function, and its operation.

## About This Guide

This guide provides the steps to install two IRM devices: the IRM-STAR and the IRM-MESH. The major difference between them is the IRM-STAR is for a Star deployment and the IRM-MESH is for a Mesh deployment.

The IR8140 acts as the root-node within the network, routing packets and information from meters or grid devices between the Adaptive Communication Technology (ACT) network and the head end (OWOC-CM).

- IRM-STAR - Installs into the Cisco® IR8140. The IRM-STAR is for Star deployments and uses a local or remote antenna.
- IRM-MESH - Installs into the Cisco® IR8140. The IRM-MESH is for Mesh deployments and uses the WPAN antenna.

## IR8140 Internetwork Operating System Extended Edition (IOS XE) Compatibility

Ensure you are running the correct IOS XE version, and correct ACTD version on your IR8140.



**Important!** For new installations, ensure you are running IOS XE version 17.9.03, or higher on your IR8140.



**Important!** The IR8140 requires ACTD version 5.0.1 or higher to operate.

For detailed information about how to upgrade your IOS version, See *OpenWay® Riva IR8140 IOS Upgrade Guide*.

The guide is divided into the following topics:

- [Introduction on page 6](#)
- [IRM-STAR and IRM-MESH Overview on page 13](#)

- [Accessories on page 19](#)
- [Star and Mesh Deployment Installation on page 24](#)
- [Replacing an Existing IRM-STAR/IRM-MESH with a New IRM-STAR/IRM-MESH in the Field on page 55](#)
- [Specifications on page 68](#)
- [RF Filter Installation on page 70](#)
- [Replacing the Alignment Guide Pin and Lock Washer on page 75](#)

## Related Product Documentation

The following documents may also be useful to readers. These documents and others can be accessed and viewed on Customer Center (<https://products.itron.com>).

**Table 1** Product related documentation

Document Name	Part Number	Link
<ul style="list-style-type: none"> <li>■ Cisco Catalyst 8140 Heavy Duty Series Router Installation Guide - Cisco Catalyst IR8140H Router Hardware Description and Specifications</li> <li>■ Cisco Catalyst 8140 Heavy Duty Series Router Software Configuration Guide - Overview</li> <li>■ Cisco Catalyst 8140 Heavy Duty Series Router Software Configuration Guide - Configuring Cisco Resilient Mesh and the WPAN Module</li> <li>■ Cisco Catalyst 8140 Heavy Duty Series Router Software Configuration Guide - Battery Backup Unit (BBU)</li> <li>■ Cisco Catalyst 8140 Heavy Duty Series Router Software Configuration Guide - Troubleshooting</li> <li>■ Industrial Security Implementation Guide</li> </ul> <p>Note: The above listed online Cisco documents should be viewed regularly pertaining to the IR8140 for possible changes.</p>	N/A	<a href="#">Cisco Catalyst IR8100 Heavy Duty Series Routers</a>
OpenWay® Riva IR8140 IOS XE Upgrade Guide	LDI-0360	N/A
Itron Knowledge Article - IR8140 - Riva - Migration from CGR1240 to IR8140	200099	<a href="#">Itron Knowledge Article 200099 - IR8140 - Riva - Migration from CGR1240 to IR8140</a>

# Regulatory Compliance

## Labeling for USA and Canada

The following information appears on labels on the exterior of the IR8140 and only applies to FCC/ISED models:

Contains (for the IR8140 LTE modem):

- FCC ID: N7NMC7455
- IC: 2417C-MC7455
- Model: MC7455

**Note:** The FCC ID, IC and Model numbers vary depending on the Cisco IR8140 unit.

Contains (for the IRM-STAR):

- FCC ID: EO9OW3
- IC: 864A-OW3
- Model: OW3
- Model Name: IRM-STAR

The following information may also appear on an exterior label:

"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."

Contains (for the IRM-MESH):

- FCC ID: SK9OW1
- IC: 864G-OW1
- Model: OW1
- Model Name: IRM-MESH

The following information may also appear on an exterior label:

"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."



## FCC Compliance

This device complies with Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. Operation is subject to the following two conditions:

- This device may not cause harmful interference.
- This device must accept any interference that may cause undesirable operation.

This device must be installed to provide a separation distance of at least 20 centimeters (7.9 inches) from all persons to be compliant with regulatory RF exposure.

## USA FCC Part 15, Class B

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.



**Caution:** To ensure system performance, this device and antenna shall not be changed or modified without the express approval of Itron. Per FCC rules, unapproved modifications or operation beyond or in conflict with these instructions for use could void the user's authority to operate the equipment.

## Canada ISED (Innovation, Science and Economic Development) Compliance

This device contains license-exempt transmitter(s)receiver(s) that comply with Innovation, Science and Economic Development Canada's license-exempt RSS(s). Operation is subject to the following two conditions:

1. This device may not cause interference; and
2. This device must accept any interference, including interference that may cause undesired operation of the device.

*L'émetteur/récepteur exempt de licence contenu dans le présent appareil est conforme aux CNR d'Innovation, Sciences et Développement économique Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes :*

1. *L'appareil ne pas produire de brouillage; et*
2. *L'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.*

Under Innovation, Science and Economic Development Canada regulations, this radio transmitter may only operate using an antenna of a type and maximum (or lesser) gain approved for the transmitter by Innovation, Science and Economic Development Canada. To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropically radiated power (e.i.r.p.) is not more than that necessary for successful communication.

*Conformément à la réglementation d'Industrie Canada, le présent émetteur radio peut fonctionner avec une antenne d'un type et d'un gain maximal (ou inférieur) approuvé pour l'émetteur par Industrie Canada. Dans le but de réduire les risques de brouillage radioélectrique à l'intention des autres utilisateurs, il faut choisir le type d'antenne et son gain de sorte que la puissance isotrope rayonnée équivalente (p.i.r.e.) ne dépasse pas l'intensité nécessaire à l'établissement d'une communication satisfaisante.*

*This radio transmitter (IC: 864G-OW1 (for IRM-MESH) or IC: 864A-OW3 (for IRM-STAR)) has been approved by Innovation, Science and Economic Development Canada to operate with the antenna types listed below, with the maximum permissible gain indicated. Antenna types not included in this list that have a gain greater than the maximum gain indicated for any type listed are strictly prohibited for use with this device.*

*Le présent émetteur radio (IC: 864G-OW1 (pour IRM-MESH) ou IC: 864A-OW3 (pour IRM-STAR)) a été approuvé par Innovation, Sciences et Développement économique Canada pour fonctionner avec les types d'antenne énumérés ci-dessous et ayant un gain admissible maximal. Les types d'antenne non inclus dans cette liste, et dont le gain est supérieur au gain maximal indiqué pour tout type figurant sur la liste, sont strictement interdits pour l'exploitation de l'émetteur.*

**Table 2** Antenna Specifications

Specifications	Itron Part Number KIT-0073-001	Itron Part Number Kit-0018-007	Itron Part Number 576414-001
IRM Module Allowed	IRM-STAR	IRM-STAR	IRM-MESH or IRM-STAR
Maximum Gain	5.5 dBi	8.15 dBi	2 dBi
Impedance	50 Ohms	50 Ohms	50 Ohms

## RF Exposure (FCC/ISED)

This equipment complies with radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance of 20 cm between this device's radiators and your body. These transmitters must not be co-located or operating in conjunction with any other antennas or transmitters, that are not part of the IR8140 Host router and IRM module.

*Cet équipement est conforme aux limites d'exposition aux radiations définies pour un environnement non contrôlé. Cet équipement doit être installé et utilisé à une distance minimale de 20 cm entre les radiateurs de l'appareil et votre corps. d'autres antennes ou émetteurs ne faisant pas partie du routeur hôte IR8140 et du module IRM.*

## Professional Installation

These antennas are intended for professional installation by the integrator. The OEM integrator is still responsible for the FCC compliance requirement of the end product, which integrates this antenna.



**Caution:** If Ethernet is used, the cable length must not exceed two meters in total. Lengths longer than two meters are not approved and do not meet FCC and ISED compliance requirements. A shielded outdoor-rated Ethernet (CAT5e or better) cable is required.

## Modification and Repairs

To ensure FCC compliance and system performance, this device, antenna and/or coaxial assembly shall not be changed or modified without the express written approval of Itron. Any unauthorized modification will void the user's authority to operate the equipment.



**Warning!** This device contains no user serviceable parts. Attempts to repair this device by unauthorized personnel may subject the person to shock hazard if removal of protected covers is attempted. Unauthorized repair voids the warranty and/or maintenance contract with your company.

## Electromagnetic Compatibility



**Caution:** Use only approved accessories with this equipment. All cables must be high quality, shielded, and correctly terminated. Unapproved modifications or operation beyond or in conflict with these use instructions may void the authority's authorization to operate the equipment.

# 2

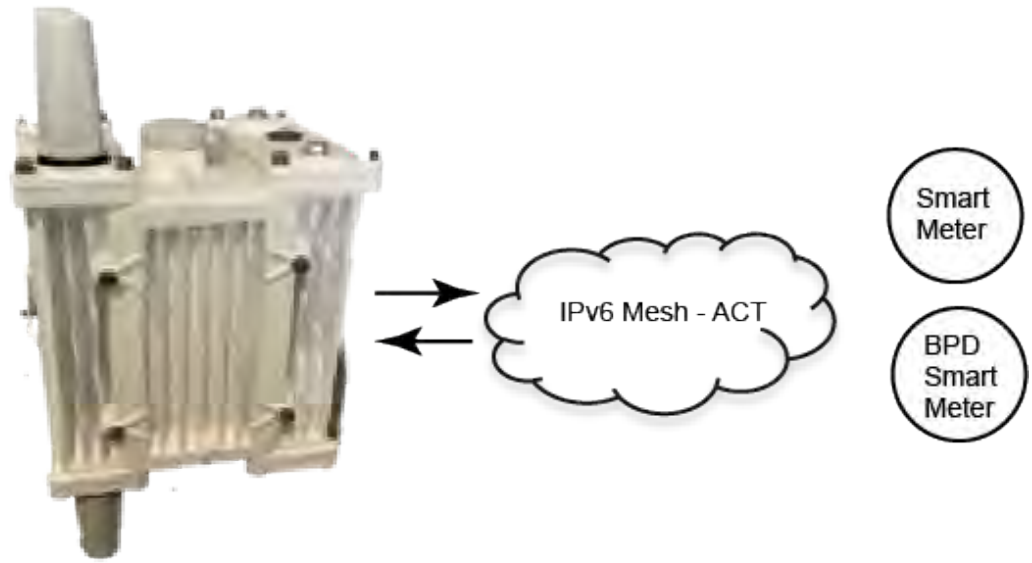
## IRM-STAR and IRM-MESH Overview

This section provides information about the modules. In general, the IRM-STAR/IRM-MESH provides connectivity to supported devices, like Electricity Meters, and Battery Powered Devices, on the Itron OpenWay® Riva Communication system when installed into an IR8140. See [OpenWay® Riva Communication System Overview on page 18](#).

The IRM-STAR/IRM-MESH resides inside the Cisco® IR8140 and acts as the root-node within the network, routing packets and information from meters or grid devices between the Adaptive Communication Technology (ACT) network and the head end (OWOC-CM). The IRM-STAR/IRM-MESH supports adaptive communications, that allows meters and grid devices to interact with each other using Radio Frequency (RF).

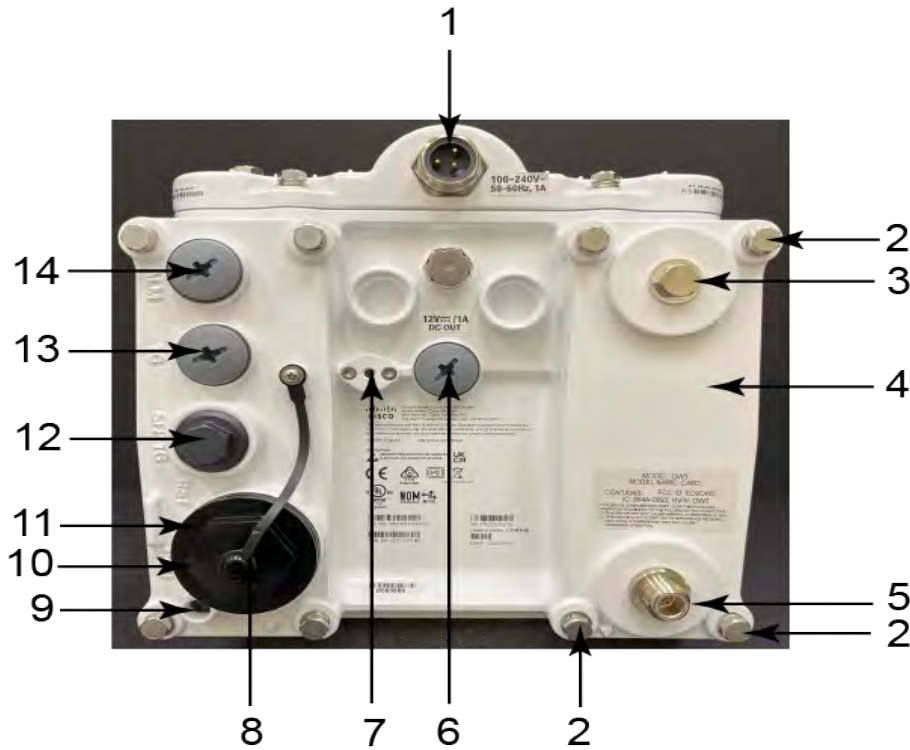
In addition to the module residing in the IR8140. The IR8140 contains one operating system: a Cisco® IOS XE. The IOS XE runs on the IR8140 and enables data communications between network nodes. IOS XE forwards traffic through regular IP forwarding mechanisms. Furthermore, the ACTD firmware runs on the IR8140. The ACTD firmware servers as a communication gateway between the IR8140's operating system (IOS XE) and the IRM-STAR/IRM-MESH. Also, the IRM-STAR/IRM-MESH contains its own firmware. The IRM-STAR/IRM-MESH firmware provides communication to the smart meters. When the IR8140 is deployed in a star configuration with Battery Powered Device (BPD), a remote antenna is required to ensure optimal radio performance. See figure.

**Figure 1** IRM-STAR/IRM-MESH functionality



The IR8140's physical features are shown and listed below.

**Figure 2** IR8140 major parts bottom view



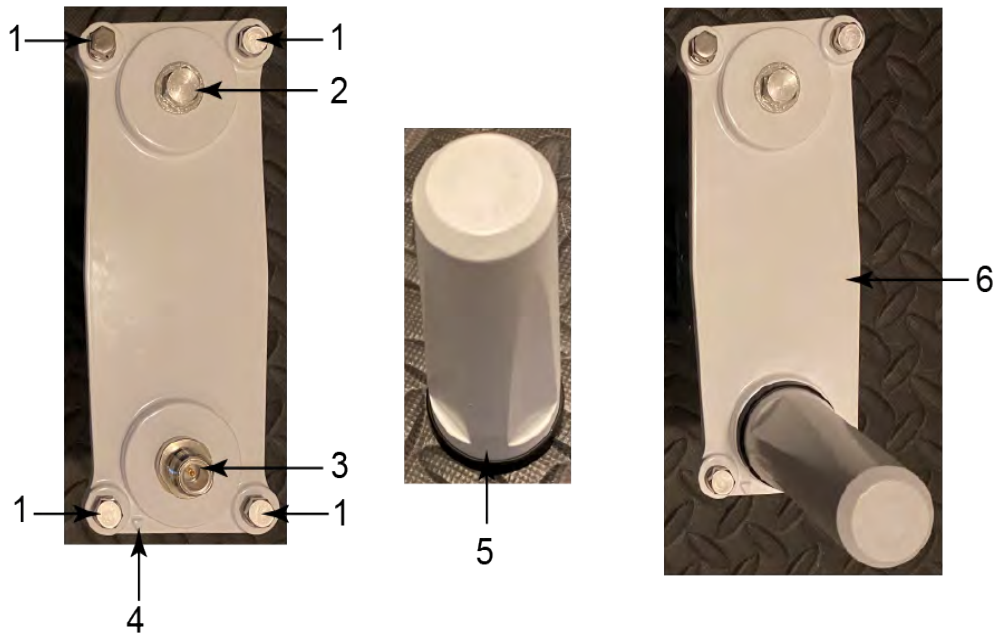
**Table 3** IR8140 major parts

Reference Number	Item
1	AC power cable connection that provides AC power source input. Hexagonal 7/8" 3-pin circular connector
2	M6 bolts - Used to assemble the face plate to the main body of the IR8140.
3	Case plug
4	IRM-STAR/IRM-MESH
5	N-Connector (Antenna) - Used to connect the Integrated Multipurpose Omnidirectional WPAN Antenna.
6	12VDC/1A DC output
7	Battery Backup Unit (BBU) locking screw - Provides security for the BBU.
8	SSD module (accessible when plug in removed) - COM port
9	LED - System OK
10	Console port, RJ-45 (accessible when plug is removed) - COM port
11	Reset button (accessible when plug is removed) - COM port

**Table 3** IR8140 major parts (continued)

Reference Number	Item
12	Small form-Factor Pluggable (SFP) 1G
13	One Gigabit Ethernet (1G) with PG13 port
14	Alarm port with PG13 port

**Figure 3** IRM-STAR major parts



**Table 4** IRM-STAR major parts

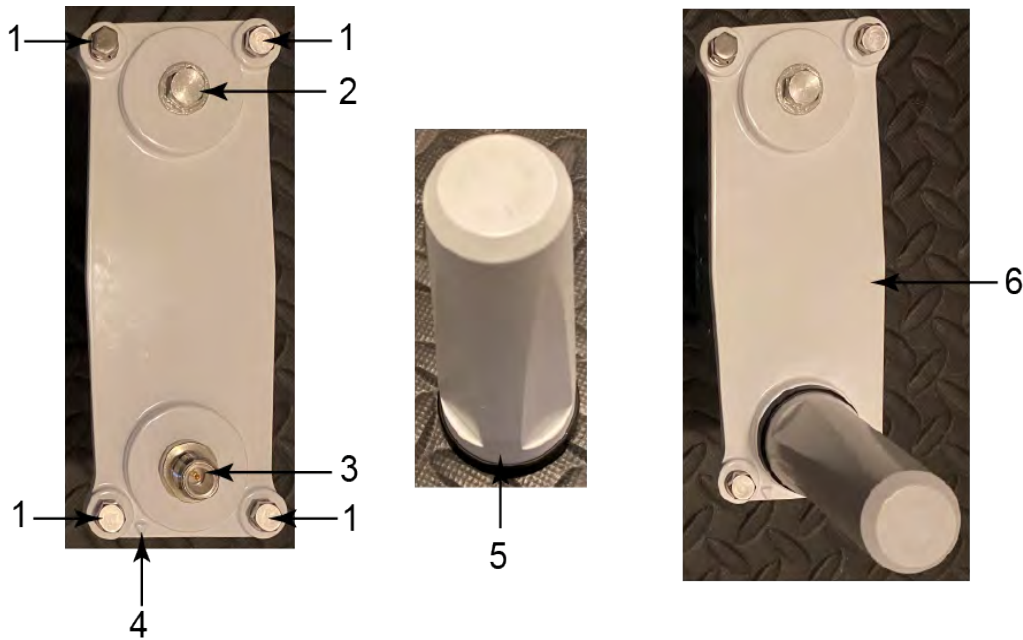
Reference Number	Item	Details
1	Four M6 bolts	Secures the IRM-STAR/IRM-MESH into the slot of the IR-8140.
2	Antenna plug	Plug is an unused antenna port.
3	N-Connector (Antenna)	Provides a connection for the Radio Frequency (RF) Antenna Cable. Used to connect to a Remote Antenna. See <a href="#">Installing the Remote Antenna on page 40</a> .
4	Module orientation indicator	Ensures the module is inserted into the slot correctly.
5	Antenna (not installed)	Integrated Multipurpose Omnidirectional WPAN Antenna.



**Table 4** IRM-STAR major parts (continued)

Reference Number	Item	Details
6	Antenna (installed)	The Integrated Multipurpose Omnidirectional WPAN Antenna installed onto the N-Connector.

**Figure 4** IRM-MESH major parts



**Table 5** IRM-MESH major parts

Reference Number	Item	Details
1	Four M6 bolts	Secures the IRM-STAR/IRM-MESH into the slot of the IR-8140.
2	Antenna plug	Plug is an unused antenna port.
3	N-Connector (Antenna)	Provides a connection for the Radio Frequency (RF) Antenna. Normally a Integrated Multipurpose Omnidirectional Wireless Personal Area Network (WPAN) Antenna is screwed onto the the N-Connector. <b>Note:</b> the IRM-MESH does not ship with the Integrated Multipurpose Omnidirectional WPAN Antenna installed.
4	Module orientation indicator	Ensures the module is inserted into the slot correctly.
5	Antenna (not installed)	Integrated Multipurpose Omnidirectional WPAN Antenna.

**Table 5** IRM-MESH major parts (continued)

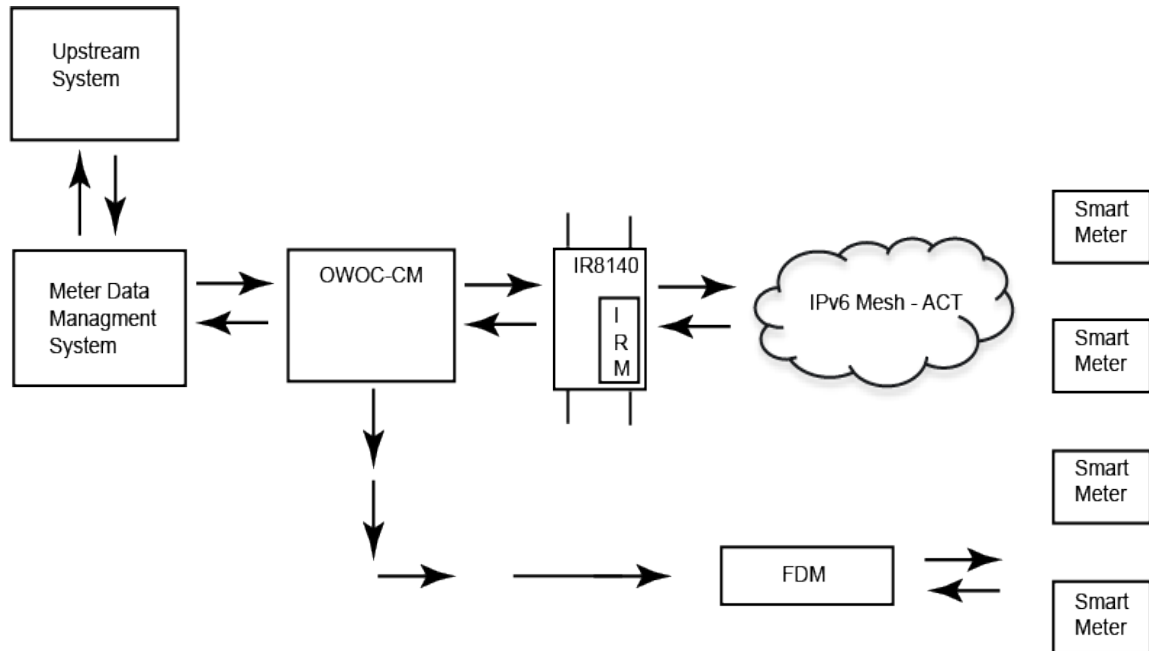
Reference Number	Item	Details
6	Antenna (installed)	The Integrated Multipurpose Omnidirectional WPAN Antenna installed onto the N-Connector.

## OpenWay® Riva Communication System Overview

The communication system features an innovative multimedia IPv6 network that uses Radio Frequency (RF) links within a mesh to route messages and data between standards-based smart meters Device Language Message Specification/Companion Specification for Energy Metering (DLMS/COSEM) and the head end system.

Intelligence in the communication module chooses the communication link quality and modulation scheme that support the best possible data rate. Data rates of up to 600Kbps are achievable by this multimedia mesh. This is done automatically in real-time by the modules without any need for pre-programming or path hard-coding. The communication modules create their own multi-hop environment using the best available physical path for communication where the routing is managed by standardized Internet Engineering Task Force (IETF) routing protocols that are independent of the physical link. See figure.

**Figure 5** OpenWay Riva Communication solution network



# 3

## Accessories

This chapter covers the following topics:

- [IRM-MESH Accessories on page 19](#)
- [IRM-STAR Accessories on page 19](#)
- [Antennas and Antenna Kits on page 19](#)

**Note:** In accordance with FCC rules, unapproved modifications or operation beyond or in conflict with these use instructions could void the user's authority to operate the equipment. Unauthorized access or modifications to the IR8140 voids the warranty.

**Note:** Not all kits are required for all installations.

### IRM-MESH Accessories

No special accessories are required with the use of IRM-MESH. However, depending on your application you may find a remote antenna helpful.

### IRM-STAR Accessories

No special accessories are required with the use of IRM-STAR, apart from the necessary Antenna Kits listed in the [Antennas and Antenna Kits on page 19](#).

### Antennas and Antenna Kits

Each IR8140/IRM installation requires one of the supported antennas for proper operation. The IR8140/IRM has been designed and approved per FCC and ISED rules to operate with these antennas.



**Caution:** Antennas not approved by Itron are strictly prohibited for use with this device. Installing the IRM with an unapproved antenna voids the product warranty and can void the user's authority to operate this equipment. This section describes the following approved antenna kits:

- 915MHz 5.5dBi (KIT-0073-001) (Star only)
- 915MHz 8.15dBi (KIT-0018-007) (Star only)
- 900MHz 2dBi (576414-001) (Mesh or Star)

The kit needed depends on where you are mounting:

- Pole Mounting, or
- Tower Mounting

And the geographical region:

- North America

## Pole Mounting Installation

- **576414-001** - The IR8140 fitted with the IRM-MESH or IRM-STAR module comes standard with an integrated multi-purpose 617-5925 MHz 2dBi Omni Antenna with a Type-N connector, Cisco part number ANT-5G-MP-OUT-N.
- **KIT-9040-001** - Remote-mount 5.5dBi antenna kit for IRM-STAR Pole Mount configuration in North America, include the following items:

**Table 6** KIT-9040-001 - IRM-STAR Pole mounting in North America Kit

Item	Kit Number	Description
Lightning Arrestor	MSE-0417-002-R	Used when connecting the IRM-STAR to an external antenna via Coaxial cable.
Coaxial Cable	KIT-9033-001	5 meter RF cable.
Remote 5.5dBi Antenna	KIT-0073-001	5.5dBi Antenna and Antenna Mounting Hardware.

**Note:** Individual items may be ordered if necessary.

## Tower Mounting Installation

- **KIT-0018-007** - Remote-mount 8.15dBi antenna kit for IRM-STAR Tower Mount configuration in North America, where the application requires greater gain, include the following items:

**Table 7** KIT-0018-007 -IRM-STAR Tower mounting in North America Kit

Item	Kit Number	Description
Remote 8.15dBi Antenna	MSE-0392-001	8.15dBi Antenna and Antenna Mounting Hardware.
Lightning Arrestor	MSE-0391-001	Lightning Arrestor.

## Antenna Supported Specifications

This table provides the specifications for the supported 915MHz antennas. The IRM is designed to operate with the antennas listed here. Antennas not listed here are strictly prohibited for use with the IRM. The required antenna impedance is 50Ω.

**Table 8** Supported 915MHz Antenna specifications

Specification	Itron Part Number KIT-0073-001	Itron Part Number KIT-0018-007	Itron Part Number 576414-001
IRM Module Allowed	IRM-STAR	IRM-STAR	IRM-MESH or IRM-STAR
Frequency range	902–928 MHz	902–928 MHz	617-960 MHz
Maximum gain	5.5dBi	8.15dBi	2dBi
Horizontal Beamwidth	Omnidirectional	Omnidirectional	Omnidirectional
Impedance	50 Ohms	50 Ohms	50 Ohms
Termination	Type N Male	Type N Male	Type N Male
Overall length	18.8"	65"	3.77"
Radome diameter	1" OD	1.31" OD	1.61" OD
Power rating	50W	100W	10W
Lightning protection	Direct ground	Direct ground	DC ground
Mounting arm length	n/a	~8 in.	Direct mounted
Weight (w/o clamps)	0.7 lbs.	3 lbs.	0.14 Lbs.
Maximum wind speed	160 mph	125 mph	165 mph
Wind load @ rated wind speed	n/a	57 lbs.	n/a

**Note:** To reduce potential radio interference to other users, select an antenna type with gain such that the Equivalent Isotropically Radiated Power (EIRP) is not more than permitted by the regulatory rules of the country where installed.

**Note:** The 8.15dBi antenna kit (KIT-0018-007) comes with a lightning arrestor that is for other types of installations and is optional. The lightning arrestor that is included with the RF Filter kit (KIT-9036-001) is the correct arrestor for this application.

## 915MHz 5.5dBi Remote Antenna Kit

The following items are included in the Remote Antenna installation kit (KIT-0073-001):

- 915MHz 5.5dBi gain antenna, Itron part number MSE-0453-001
- Antenna mounting kit:
  - Remote-mount adapter
  - Antenna holder
  - Mounting bracket

- 6-inch bolts (4)
- 1<sup>3</sup>/<sub>4</sub>-inch bolts (2)
- Flat washers (6)
- Split washers (6)
- Nuts (6)
- Pipe clamp hangers (2)
- Silicone seal
- Anti-seize lubricant



**Caution:** Do not install a 5.5dBi antenna directly on the IR8140/IRM. Antenna installation directly on the IR8140/IRM compromises mechanical integrity and will not meet the compliance requirements.

## 915MHz 8.15dBi High Gain Remote Antenna Kit

The following table provides coaxial cables that support the Remote-Mount High-Gain 915MHz antenna (KIT-0018-007). When a high-gain antenna is installed for the IRM, follow the FCC and ISED set limits for the transmit power of the IRM. To meet these limits, IRM must have the minimum required loss between the IR8140 and the antenna. Allow 0.1dB loss for each connector. If required, you may use 1dB attenuator(s) (similar to the Pasternack PE7002-1) to attain the desired power at the antenna.



**Important!** To prevent exceeding the maximum EIRP set by the FCC and ISED, there must be at least 2.2 dB of loss between the IRM-STAR module antenna connector and the 8.15 dBi antenna.



**Caution:** Do not install a 8.15dBi antenna directly on the IR8140/IRM. Antenna installation directly on the IR8140 compromises mechanical integrity and will not meet the compliance requirement for a loss of 2.2dB (for any exceptions, there is additional information, see [RF Filter Installation on page 70](#)) between the IR8140 and the 8.15dBi antenna.

**Table 9** Supported Coaxial Cables for the 915MHz 8.15dBi Antenna Kit (High Gain Remote)

Coaxial Cable Specification	Total Coaxial Length		
	0–120 ft.	121–200 ft. (High-Gain Antenna only)	201–250 ft. (High-Gain Antenna only)
Standard black jacket cable	AVA5-50	AVA6-50	AVA7-50
Optional fire retardant cable	AVA5RK-50	AVA6RK-50	AVA7RK-50
Cable diameter (nominal)	$\frac{7}{8}$ in.	1 $\frac{1}{4}$ in.	1 $\frac{5}{8}$ in.

**Table 9** Supported Coaxial Cables for the 915MHz 8.15dBi Antenna Kit (High Gain Remote) (continued)

Coaxial Cable Specification	Total Coaxial Length		
	0–120 ft.	121–200 ft. (High-Gain Antenna only)	201–250 ft. (High-Gain Antenna only)
Cable weight (lb./ft.)	0.33	0.46	0.70
Minimum bend radius	10 in.	8 in.	15 in.
Cable attenuation @ 915 MHz	~1.2 dB/100 ft.	~0.84 dB/100 ft.	~0.70 dB/100 ft.

# 4

## Star and Mesh Deployment Installation

This chapter includes the following topics:

- [Disconnecting Power to the IR8140 on page 25](#)
- [Removing the IR8140 from the Pole on page 29](#)
- [Installing the IRM-STAR and IRM-MESH on page 32](#)
- [Reinstalling the IR8140 Back on the Pole on page 38](#)
- [Installing the Remote Antenna on page 40](#)
- [Reinstalling the Power and Ground to the IR8140 on page 51](#)



**Caution:** The IRM-STAR is for Star deployments and uses the remote antenna . In contrast, the IRM-MESH is for Mesh deployments and uses the WPAN antenna instead. This is the only difference when is comes to deployment between the two devices.

## Requirements and Materials

The following procedures in this chapter, apply to IRM-STAR/IRM-MESH installations in a IR8140 for which the following conditions apply:

- Either the IR8140 does not contain an existing IRM *or* it does contain an existing IRM deployed in either a Star or Mesh configuration.
- The IR8140 (with the newly installed IRM-STAR/IRM-MESH) is to be deployed in a Star or Mesh configuration.

Collect the following items before you start.

- IR8140
- IRM-STAR/IRM-MESH with FCC regulatory label
- Remote antenna kit that is allowed for your IRM type. See [Antenna Supported Specifications on page 20](#).
- 10mm socket wrench.
- A #2 Phillips or a 9/32" flat-blade screwdriver.
- 15/16" combination wrench.

## Order of Installation

In general, this provides the order of installation that should be followed.



1. Disconnecting Power to the IR8140
2. Removing the IR8140 from the pole.
3. If applicable, removing the RF Filter from the pole. See [Connecting a RF Filter on page 72](#) and simply reverse the connection order.
4. If applicable, removing an existing IRM.
5. Installing the IRM-STAR/IRM-MESH.
6. Reinstalling the IR8140 back on the pole. If required, include a RF Filter. See [RF Filter Installation on page 70](#).
7. Reinstalling Power and the Ground to the IR8140.
8. Installing the Lightning Arrestor to the IR8140.
9. This step is only applicable for a IRM-STAR. Installing the Remote Antenna on the pole (five feet vertical distance from the IR8140).

## Disconnecting Power to the IR8140

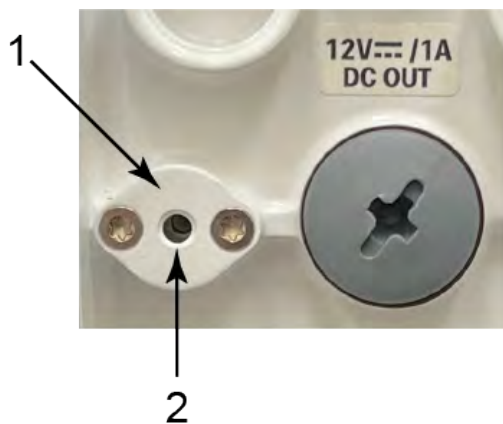
1. Disable the power at the circuit, or power supply that the IR8140 AC Power Cable is connected.
2. Disconnect the IR8140 AC Power Cable, see item 1, from the AC Power Connector located on the bottom of the IR8140.

**Figure 6** AC power cable connection location



3. Back out the BBU security screw until it hits the retention plate.

**Figure 7** BBU security screw



**Table 10** BBU security screw items

Reference Number	Item
1	Retention plate (Do not remove)
2	BBU security screw (Requires 3mm Hex head)

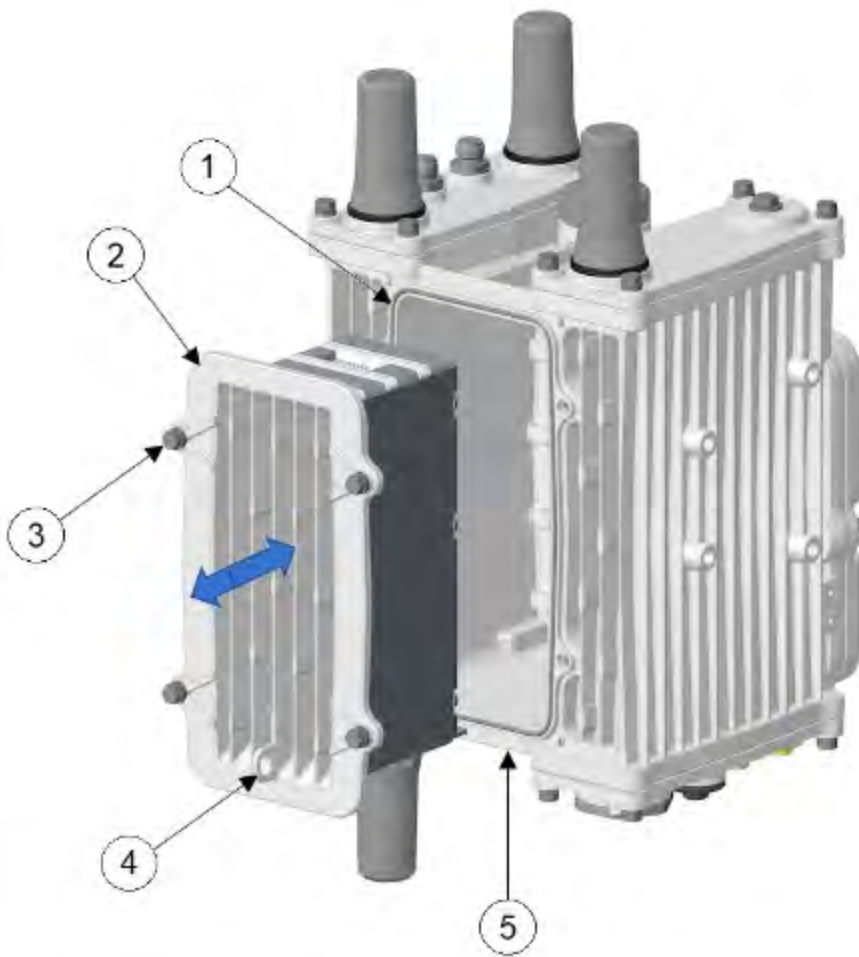
4. Loosen the four M6 bolts with a 10mm socket driver on the BBU faceplate. Ensure you do not remove the M6 bolts from the faceplate.
5. Pull the BBU assembly out straight.



**Caution:** The BBU assembly is heavy.

6. Ensure the BBU gasket stays in place and the sealing surface is clean from any debris.

**Figure 8** BBU assembly items



**Table 11** BBU assembly items

Reference Number	Item
1	BBU gasket
2	BBU assembly
3	Four M6 bolts

**Table 11** BBU assembly items (continued)

Reference Number	Item
4	Padlock tab
5	BBU security screw, located on the bottom of the IR8140.

7. Check the System (SYS) LED, see item 1, to ensure the IR8140's power is off. The SYS LED is located on the bottom exterior of the IR8140 enclosure.

**Figure 9** System (SYS) LED location



**Table 12** System (SYS) LED location

Reference Number	Item	Details
1	LED	System (SYS) LED

## IRM-STAR/IRM-MESH Slot Power Down on IR8140

The IRM-STAR/IRM-MESH may be safely inserted or removed after powering down the IR8140's slot. Ensure you follow safe Electrostatic Discharge (ESD) and handling

procedures. This is not considered a hot swap since the IRM-STAR/IRM-MESH is being inserted or removal when power is not applied.

```
Router#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#hw-module subslot 0/1 shutdown unpowered
Router(config)#
Feb 10 21:05:33.145: %SPA_OIR-6-SHUTDOWN: subslot 0/1 is administratively shutdown; Use
'no hw-module shutdown' to enable
Feb 10 21:05:33.174: %SPA_OIR-6-OFFLINECARD: SPA (IRMH-WPAN-NA) offline in subslot 0/1
Router(config)#
Router(config)#hw-module subslot 0/3 shutdown unpowered
Router(config)#
Feb 10 21:06:18.532: %SPA_OIR-6-SHUTDOWN: subslot 0/3 is administratively shutdown; Use
'no hw-module shutdown' to enable
Feb 10 21:06:18.555: %CELLWAN-2-MODEM_DOWN: Modem in slot 0/3 is DOWN
Feb 10 21:06:18.556: %CELLWAN-2-MODEM_DOWN: Modem in slot 0/3 is DOWN
Feb 10 21:06:18.558: %SPA_OIR-6-OFFLINECARD: SPA (IRMH-LTEA-EA-900) offline in subslot
0/3
Router(config)#
Feb 10 21:06:29.549: %IOSXE-3-PLATFORM: R0/0: ngiolite: SignalHandler[15][Terminated]pid
[21060]thread[21060][ngiolite]
Router(config)#no hw-module subslot 0/3 shutdown unpowered
Router(config)#
Feb 10 21:07:05.561: %SPA_OIR-6-ONLINECARD: SPA (IRMH-LTEA-EA-900) online in subslot 0/3
Router(config)#
Router(config)#no hw-module subslot 0/1 shutdown unpowered
Router(config)#
Feb 10 21:07:23.610: %SPA_OIR-6-ONLINECARD: SPA (IRMH-WPAN-NA) online in subslot 0/1
Router(config)#
Router(config)#
```

## Removing the IR8140 from the Pole

You must first disconnect the Power, the Ground Cable, physically unmount the IR8140, and remove the IR8140 mounting bracket so that you can access the connection points. ?



**Warning!** After removing the IR8140 from the pole, place the IR8140 on an electrostatic discharge (ESD) protected mat to prevent personal injury and/or damage to the electronic components.

1. Disconnect the power. See [Disconnecting Power to the IR8140 on page 25](#).
2. Remove the 6AWG Ground Cable, see item 2, located on the bottom right side of the IR8140 by removing the two screws from the ground lug, see item 1.

**Note:** When installing the Ground Cable, refer to the Cisco instructions for specific details.

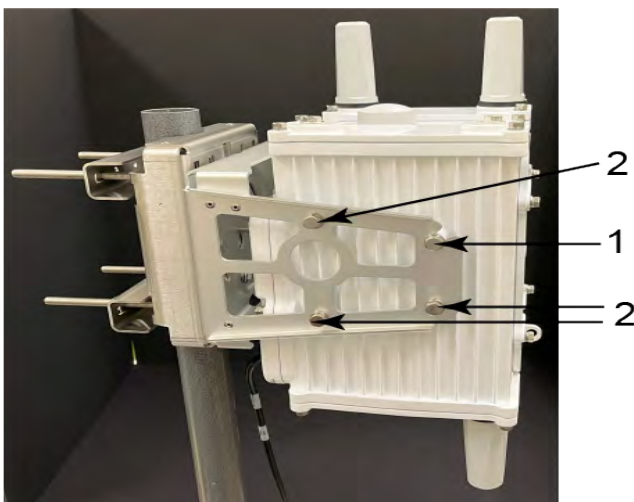
**Figure 10** 6AWG Ground cable and ground lug location



3. Remove the IR8140.

- a. First, loosen the top front hex bolt, see item 1, on each side of the Mounting Bracket.
- b. Then, completely remove the two rear and lower front hex bolts, see item 2, on each side of the Mounting Bracket.
- c. Lift the router up and off the bracket.

**Figure 11** Mounting bracket side hex bolt location

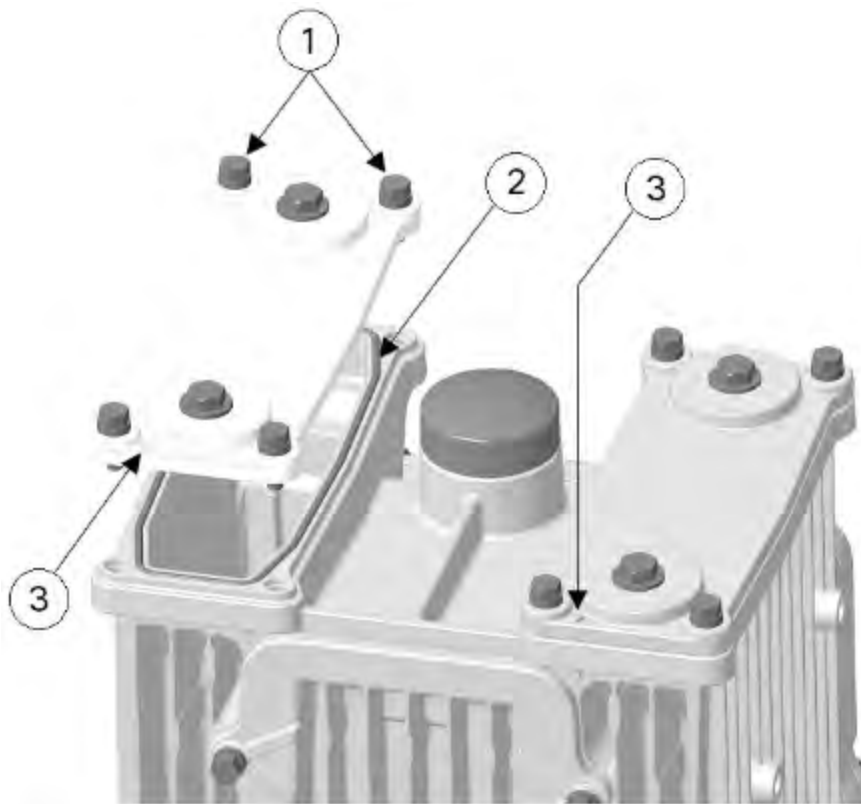


## Removing the Blank Cover

This section only applies if there is an existing blank cover.

1. Disable the installed BBUs, and disconnect the IR8140 from AC power.
2. Remove the cables attached to the IR8140.
3. Loosen the four M6 bolts on the blank cover using a 10mm socket driver. Do not remove the bolts from it.
4. If present, remove the blank cover from slot 1.

**Figure 12** Blank cover removal



**Table 13** Blank cover removal

Reference Number	Item
1	M6 bolts
2	Gasket
3	Module orientation indicator

1. Pull the blank cover from the IR8140.
2. Ensure the gasket is fully contained in the groove and no debris is on the gasket surface.

3. Install the new module. See [Installing the IRM-STAR and IRM-MESH on page 32](#).
4. Connect the IR8140 to AC power and to the network.
5. Re-enable the BBUs using the applicable commands.

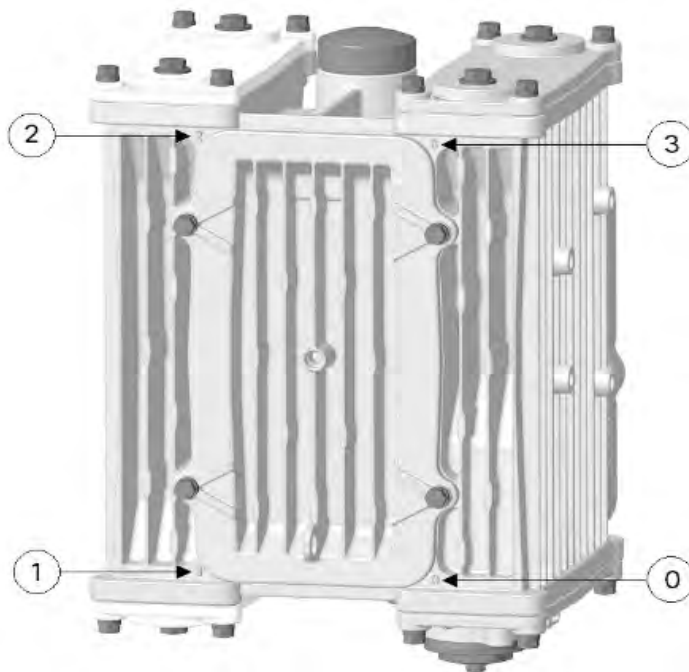
## Installing the IRM-STAR and IRM-MESH



**Important!** The IRM-STAR/IRM-MESH only fits into specific slot as detailed below. This is required for sufficient heat dissipation.

1. Locate applicable slot locations inside the IR8140.

**Figure 13** IR8140 module slot locations



**Table 14** IR8140 module slot locations

Reference Number	Item
0	Slot 0 - CPU/Supervisor module slot, always
1	Slot 1 - IRM-MESH or IRM-STAR slot, only
2	Slot 2 - <ul style="list-style-type: none"> <li>■ For IRM-STAR only, Slot 2 is empty.</li> <li>■ For IRM-MESH only, the Cellular modem module is installed in Slot 2.</li> </ul>
3	Slot 3 - <ul style="list-style-type: none"> <li>■ For IRM-STAR only, the Cellular modem module is installed in Slot 3.</li> </ul>



**Table 14** IR8140 module slot locations (continued)

Reference Number	Item
	<ul style="list-style-type: none"> <li>■ For IRM-MESH only, the Cellular modem module is installed in Slot 2.</li> </ul>

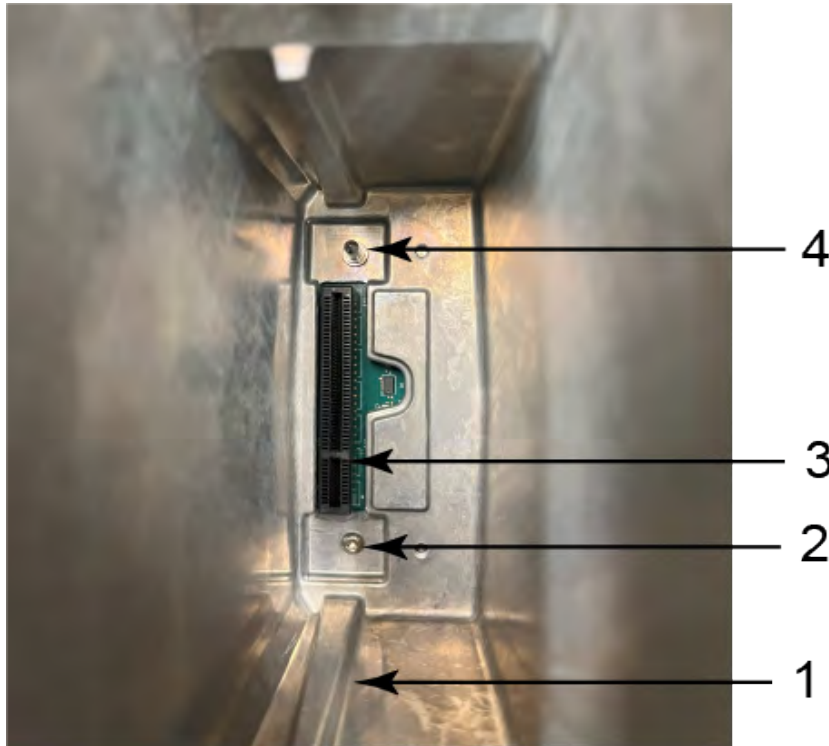
1. Disable any installed BBUs, and disconnect the IR8140 from AC power if not already done.
2. If there is a blank cover over the slot remove it. See [Removing the Blank Cover on page 31](#).
3. Ensure the gasket is fully seated in the groove, not damaged, and if damaged, replace. A new gasket can be obtained from Cisco. Also, check that there is no debris on the gasket and matting surfaces.

**Note:** This view is representative of all slots.

**Figure 14** Slot items



**Figure 15** Slot items close-up

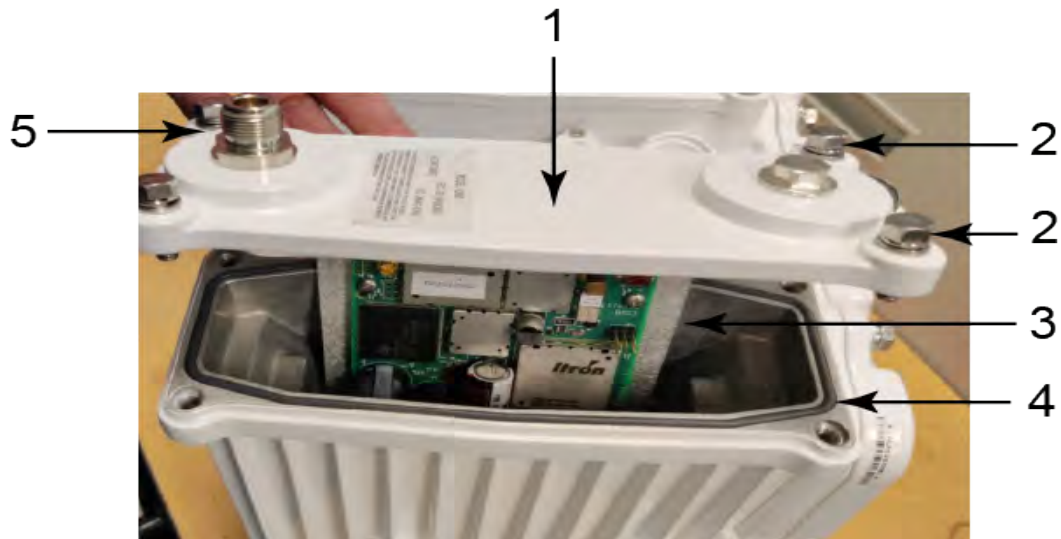


**Table 15** Slot items

Reference Number	Item
1	Chassis guide slot
2	Replacement screw
3	IRM-STAR/IRM-MESH interface connector
4	Alignment guide pin (1 of 2 shown)

4. Remove the alignment guide pin and replace it with the screw prior to inserting the IRM-STAR/IRM-MESH, if present. See [Replacing the Alignment Guide Pin and Lock Washer on page 75](#).
5. Insert the IRM-STAR/IRM-MESH into slot 1 of the IR8140. Align the module orientation indicator with the front of the IR8140, see item 4. Ensure that the IRM-STAR/IRM-MESH PCBs edge connector aligns with the PCI-E 98-pin connector on the IR8140 mother board, see item 5. Gently press the IRM-STAR/IRM-MESH until the card-edge connector is firmly seated into the connector.

**Figure 16** Inserting IRM-STAR/IRM-MESH

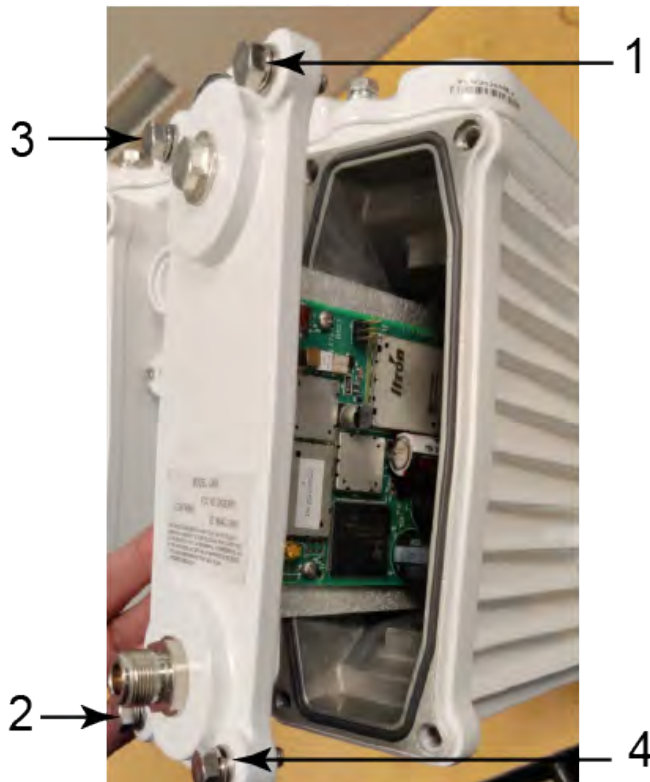


**Table 16** Inserting IRM-STAR/IRM-MESH

Reference Number	Item
1	IRM-STAR/IRM-MESH
2	M6 bolts
3	Align PCBs edge connector with the PCI-E 98-pin connector
4	Gasket
5	Module orientation indicator

6. Tighten the four M6 bolts to 15 to 20 in-lbs in the 1, 2, 3, 4 sequence shown using a 10mm socket driver. Do not chip or scratch the paint.

**Figure 17** Tighten M6 bolts



7. Attach the RF cable, or antenna to the N-connector on the IRM-STAR/IRM-MESH as needed.
8. For Integrated Multipurpose Omnidirectional WPAN Antenna, inspect the gasket located at the bottom, to ensure it is not damaged. If damaged, replace the WPAN antenna with a new WPAN antenna.

**Figure 18** Integrated Multipurpose Omnidirectional WPAN Antenna gasket



**Table 17** Integrated Multipurpose Omnidirectional WPAN Antenna with gasket

Reference Number	Item
1	Integrated Multipurpose Omnidirectional WPAN Antenna
2	Gasket

9. Connect the IR8140 to the AC power and to the network.
10. Re-enable the BBUs using the applicable commands.

**Note:** The IRM-STAR/IRM-MESH allows two antenna connection options: either an antenna connected directly to the IRM-STAR/IRM-MESH N-Connector, or a remote mounted antenna connection.

For more information about the remote antenna. See [Installing the Remote Antenna on page 40](#)

11. Clean the surface and affix the regulatory label (included in the IRM-STAR/IRM-MESH installation kit) to the front bottom right of the exterior of the IR8140 shown in the figure.

**Figure 19** Regulatory label placement location



The following line should be included on the label:

For IRM-MESH - Contains: FCC ID: SK9OW1

For IRM-STAR - Contains: FCC ID: EO9OW3

## Reinstalling the IR8140 Back on the Pole

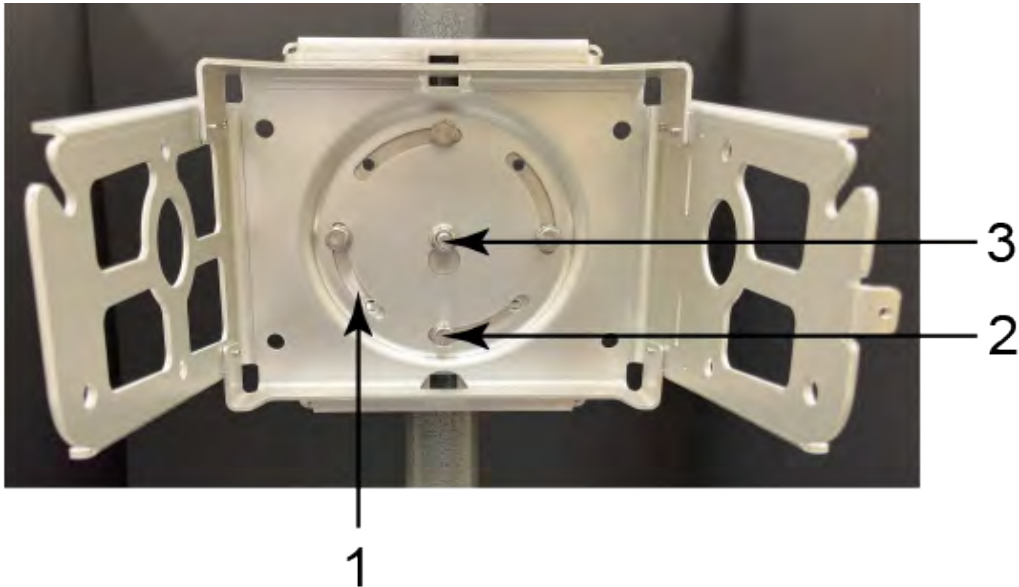
After installing the new IRM-STAR/IRM-MESH in the IR8140, you can reinstall the mounting bracket, and reinstall the IR8140.

1. Insert the four (8mm x 25mm) hex bolts, see item 2, supplied with the installation kit into the threaded holes in the base mounting plate. Do not tighten bolts until all are started.

**Note:** The four alignment slots, see item 1, in the mounting brackets allow the IR8140 to be rotated either clockwise or counterclockwise for alignment purposes. Inserting the mounting bolts as shown allows the IR8140 to rotate counterclockwise. Inserting all four bolts in the holes at the other end of the slot allows the IR8140 to be rotated clockwise.

2. Adjust the alignment of the IR8140 to the desired orientation and tighten the four mounting bolts and the self-locking hex nut on the center stud, see item 3. Use a torque of 6 to 7ft-lb when tightening the bolts and nut.

**Figure 20** Hex bolts, alignment slots and self-locking hex bolt location



3. Mount the IR8140 to the mounting bracket by sliding the hex bolt, see item 1, in the top front position on each side of the IR8140 into the corresponding slot on the mounting bracket.

**Figure 21** Mounting bracket and hex bolt installation

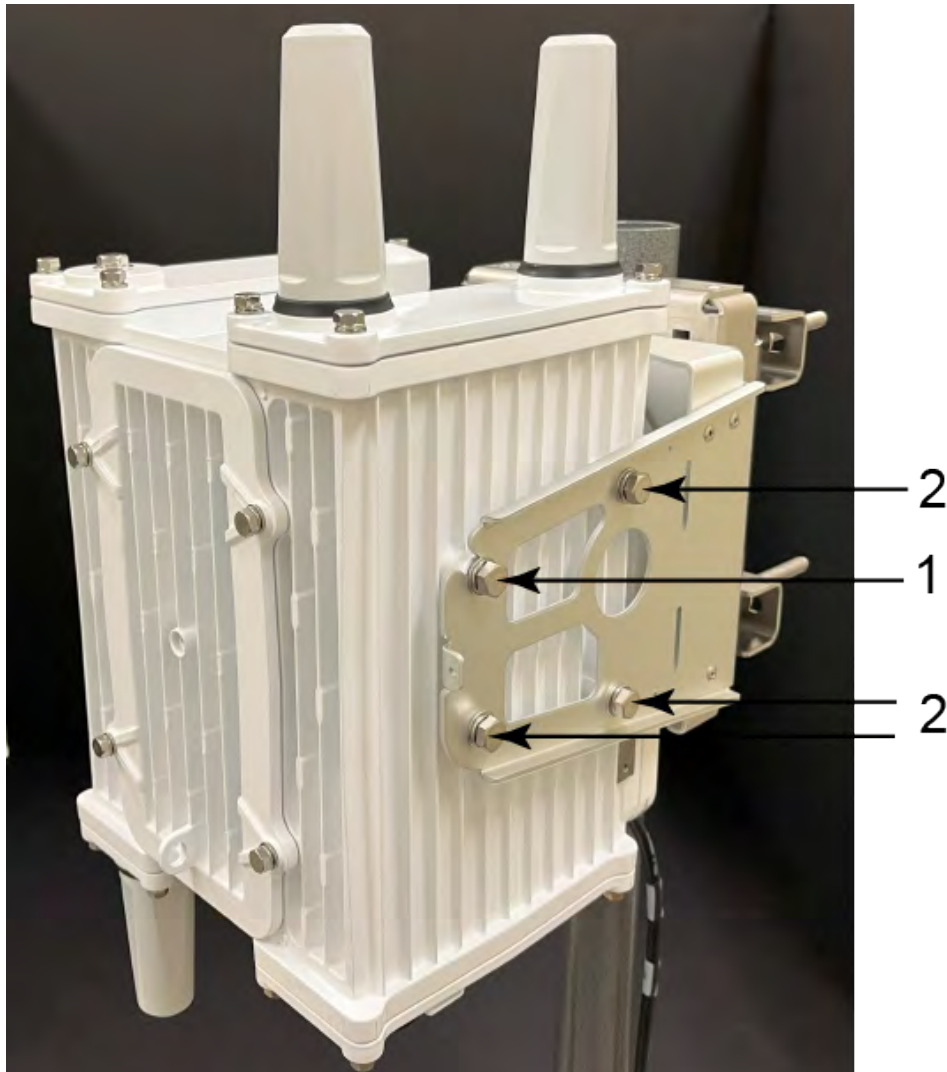


4. Insert the remaining three hex bolts, see item 2, on each side of the IR8140 into their respective places.

**Note:** Insert all hex bolts on each side before securing tightly.

5. Tighten all hex bolts. Use a torque of 6 to 7ft-lb when tightening the bolts.

**Figure 22** Hex bolts location on side of IR8140



## Installing the Remote Antenna

A remote antenna is required to ensure optimal radio performance when the IR8140 with a IRM is deployed in a Star configuration for communication with Battery Powered Devices (BPDs). Standard height remote antennas are mounted directly above the IR8140 (3 to 5 feet above the IR8140). Remote antennas can also be mounted at an extended height above the IR8140.



**Note:** Depending on the geographic region where the IR8140 with IRM is installed, a RF filter may be required with a remote antenna. A RF filter is required for installations in Australia, and other locations. A RF filter is not required for IRM installations in North America. See [RF Filter Installation on page 70](#).



**Caution:** The IRM-STAR is for Star deployments and uses as integrated antenna or a remote antenna. In contrast, the IRM-MESH is for Mesh deployments and uses the integrated Multipurpose Omnidirectional WPAN antenna instead. This is the only difference when it comes to deployment between the two devices.

## Placement Guidelines for Remote Antenna

Antenna placement is one of the most important factors in determining overall system performance. Careful consideration must be given to proper antenna placement. Follow these general guidelines when determining the ideal location for a remote-mounted remote antenna:

- Mount the antenna vertically.
- Mount the antenna in a location where there is a clear, unobstructed, 360-degree view of the horizon. The antenna receives and transmits in all directions. Objects such as building walls, nearby metal surfaces, or other obstructions might interfere with the proper operation of the antenna.
- Do not mount the antenna on a rooftop where nearby buildings are higher than the installation location.
- Do not mount the antenna near existing RF radiating antennas. If existing RF radiators are nearby, the horizontal separation distance must be a minimum of 30 meters and/or three meters of vertical separation. In instances where nearby RF radiators are present, conduct an inter-modulation interference study to evaluate the potential for interference and any effects it may have on system performance. Consult your Itron systems engineer for more information.
- Height is preferred for optimal performance. Itron typically recommends installing the antenna no higher than 20 to 30 meters. Check with your systems engineer.



**Caution:** Do not install a 5.5/5.15 dBi antenna directly on the IR8140. Antenna installation directly on the IR8140 will compromise mechanical integrity and will not meet the compliance requirements. See [915MHz 5.5dBi Remote Antenna Kit on page 21](#).



**Caution:** Do not install a 8.15 dBi antenna directly on the IR8140. Antenna installation directly on the IR8140 will compromise mechanical integrity and will not meet the compliance requirement for a loss of 2.2dB (for any exceptions, there is additional information, [RF Filter Installation on page 70](#)) between the RF filter and the 8.15 dBi antenna. See [915MHz 8.15dBi High Gain Remote Antenna Kit on page 22](#) and [22915MHz 8.15dBi High Gain Remote Antenna Kit on page 22](#).

A side-arm antenna installation must be done if the antenna is mounted where it does not have an unobstructed 360-degree view. Refer to the following guidelines for a side-arm antenna installation:

- The minimum standoff distance is 60 centimeters, where the interfering structural members are 10 centimeters or less in diameter and spaced more than two meters apart.
- For structural members between 10 and 25 centimeters in diameter, use a sliding scale of 0.6 to 1.5 meters (for example, a 60-centimeter standoff at 10-centimeter diameter to a 150-centimeter standoff at 25-centimeter member diameter).

## Remote Antenna Connections & the Lightning Arrestor

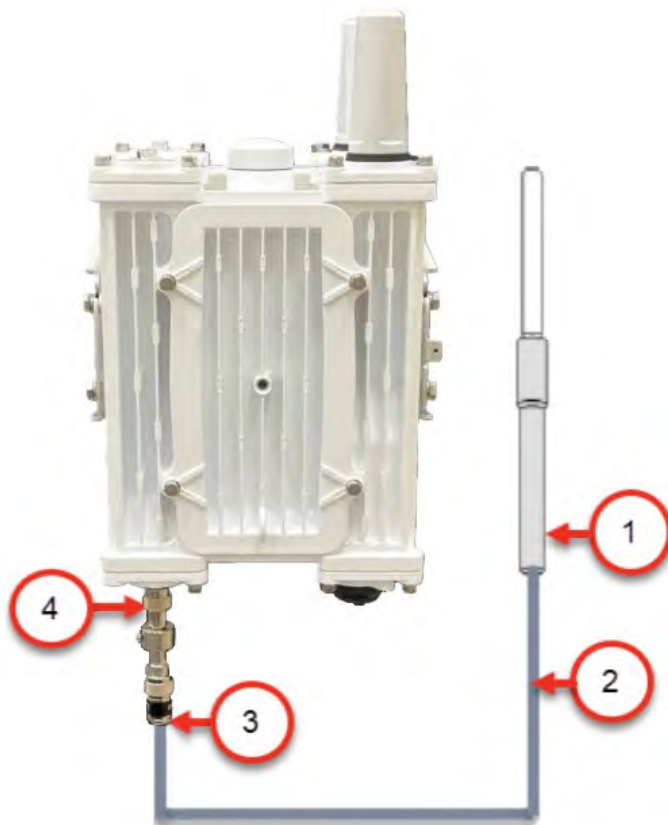
When using a remote antenna, you must install a lightning arrestor to protect the IRM-STAR and IR8140 in the event of a lightning strike. The lightning arrestor is fitted between the coaxial antenna cable and the IR8140 (or the RF Filter, if applicable). The protected end of the arrestor connects to the N Connector on the IRM-STAR (or RF Filter). The surge end of the arrestor is connected to the antenna cable. The arrestor is also furnished with a ground lug.



**Caution:** The lightning arrestor must be connected to an earth-ground.

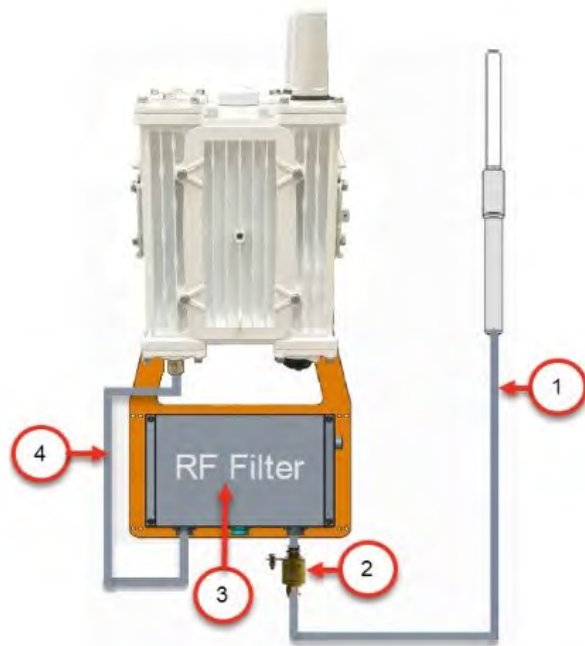
This figure shows the Remote Antenna connected to a IR8140 without a RF Filter. Specifically, shows the Remote Antenna, item 1, a RF Cable, item 2, the Lightning Arrestor, item 3, and the IRM-STAR N Connector, see item 4.

**Figure 23** Remote antenna, lightning arrestor connections without a RF filter



This figure shows the Remote Antenna and a RF Filter connected to a IR8140. Specifically, shows the RF Cable, item 1, that connects between the RF Filter and the Antenna, the Lightning Arrestor, item 2, the RF Filter, item 3 and the RF Cable, item 4, that connects between the IR8140 N-Connector and the RF Filter.

**Figure 24** Remote antenna, lighting arrestor connections with a RF filter



## Assembling and Attaching the Antenna

This section describes the procedures needed to assemble the remote antenna and attach it to the IR8140. You will also need to install a grounded lightning arrestor to prevent lightning damage to the IR8140. See [Remote Antenna Connections & the Lightning Arrestor on page 42](#).

### Assembling the Remote Antenna

1. Remove the black rubber bumper from the end of the antenna.

**Figure 25** Rubber bumper location



2. Slide the silicone seal over the base of the remote antenna.

**Figure 26** Silicone seal application



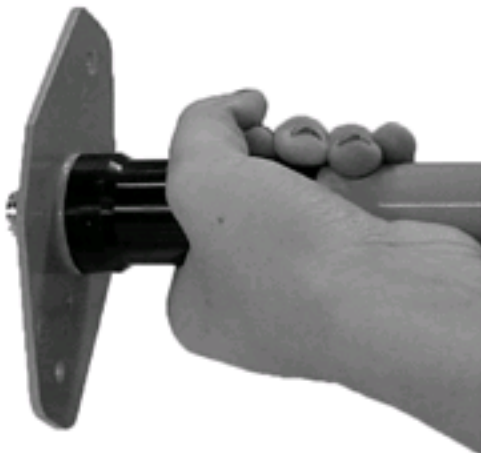
3. Screw the remote antenna base into the top of the remote mount adapter plate.

**Figure 27** Remote antenna base to remote adapter plate



4. Push the silicone seal down over the top of the remote mount adapter plate.

**Figure 28** Silicone over the remote mount adapter plate



5. Slide the antenna holder over the silicone seal.

**Figure 29** Remote antenna holder over the silicone



6. Make sure that the remote antenna holder and the adapter plate are flush on all sides

**Figure 30** Inspect remote antennaholder and adapter plate



## Attaching the Remote Antenna to the IR8140 Mounting Bracket

Use the following procedure to attach the antenna to the IR8140 mounting bracket:

1. Push the 1 $\frac{3}{4}$ " bolt through the antenna holder, the remote mount adapter plate, and the mounting bracket

2. Place the flat washer on the bolt.
3. Place the split washer on the bolt.
4. Add a drop of anti-seize lubricant to the nut and attach the nut to the bolt.
5. Replace the black rubber bumper on the end of the antenna.

**Figure 31** Remote antenna to IR8140 mounting bracket



## Weatherproofing the RF Connections

1. Wrap vinyl electrical tape around the connection, starting at the RF Filter and moving up the cable as shown in the figure.



**Figure 32** Starting the electrical tape application



The vinyl electrical tape provides a foundation for the Butyl rubber sealant, making it easier to disconnect the cable.

2. Wrap the vinyl electrical tape up the coaxial cable, overlapping each wrap as shown in the figure.

**Figure 33** Fully covered electrical tape application



3. Ensure that the tape fully covers the cable strain relief.
4. Wrap a layer of Butyl rubber sealant over the vinyl electrical tape

**Figure 34** Butyl rubber application



5. Ensure that the Butyl rubber extends past the vinyl electrical tape and onto the cable jacket.
6. Overlap the Butyl rubber so that no gap exists. The Butyl rubber self-vulcanizes over time and the seam disappears.
7. Wrap vinyl electrical tape around the Butyl rubber, starting at the filter and moving up as you did in step 1.

**Figure 35** Electrical tape application around the Butyl Rubber



8. Continue wrapping the vinyl electrical tape in a spiral back down to the filter. You should now have two layers of vinyl electrical tape covering the Butyl rubber.

## Reinstalling the Power and Ground to the IR8140

After installing the new IRM-STAR and the remote antenna, you can reconnect power and ground the IR8140, attach the lightning arrestor, and weatherproof the connections.



**Caution:** If Ethernet is used, the cable length must not exceed two meters in total. Lengths longer than two meters are not approved and do not meet FCC and ISED compliance requirements. A shielded outdoor-rated Ethernet (CAT5e or better) cable is required.

1. Reinstall the 6AWG Ground Cable, see item 2, located on the bottom right side of the IR8140 using the two screws into the ground lug, see item 1.

**Figure 36** 6AWG ground cable and ground lug location



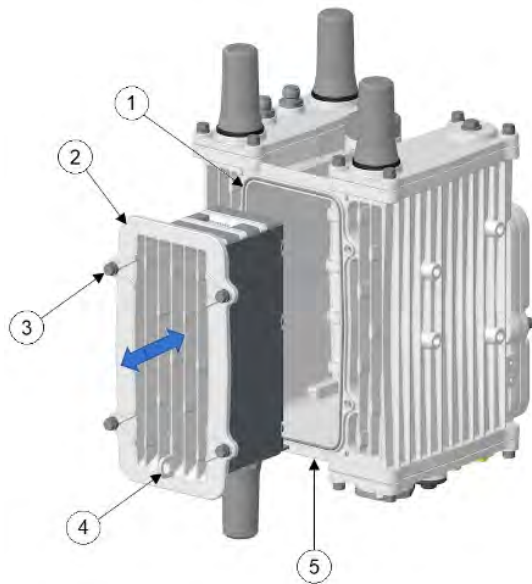
2. Enable the power at the circuit, or power supply that the IR8140 AC Power Cable is connected.
3. Install the IR8140 AC Power Cable, see item 1, to the AC Power Connector located on the bottom exterior of the IR8140 enclosure.

**Figure 37** AC power cable connection location



4. Insert the BBU assembly in straight.

**Figure 38** BBU assembly items



**Table 18** BBU assembly items

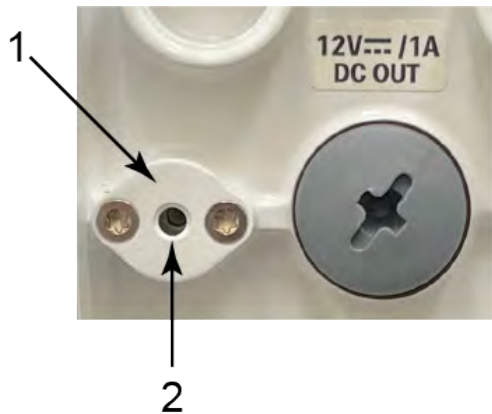
Reference Number	Item
1	BBU gasket
2	BBU assembly
3	Four M6 bolts
4	Padlock tab
5	BBU security screw, located on the bottom of the IR8140.



**Caution:** The BBU assembly is heavy.

5. Ensure the BBU gasket stays in place and the sealing surface is clean from any debris.
6. Tighten the bolts using a 10mm socket driver on the BBU faceplate. Torque to 15-20 in-lbs in the sequence shown.
7. Tighten and torque the BBU security screw to 10-12 in-lbs.

**Figure 39** BBU security screw



**Table 19** BBU security screw items

Reference Number	Item
1	Retention plate (Do not remove)
2	BBU security screw (Requires 3mm Hex head)

8. Check the System (SYS) LED, see item 1, to ensure the IR8140's power is on. The SYS LED is located on the bottom exterior of the IR8140 enclosure.

**Figure 40** System (SYS) LED location



**Table 20** System (SYS) LED location

Reference Number	Item	Details
1	LED	System (SYS) LED

# 5

## Replacing an Existing IRM-STAR/IRM-MESH with a New IRM-STAR/IRM-MESH in the Field

This chapter covers the following topics:

- [Removing an Existing IRM-MESH/IRM-STAR on page 56](#)
- [Installing the New IRM-STAR/IRM-MESH on page 62](#)



**Important!** In some geographic territories, such as North America (NAM), the RF Filter is not needed with a IRM-STAR and may be removed if it is already installed for an earlier IRM. In this case, the remote antenna can be installed without the filter, but it should NOT be connected directly to the IR8140. See [Installing the Remote Antenna on page 40](#).



**Important!** IRM Modules purchased along with the IR8140 units under a single CustPart can only be RMA'd as a complete unit and should not be split in to IR8140 only or IRM Module only.



**Important!** Prior to replacing a IRM with a new IRM-STAR/IRM-MESH, ensure you install correct IOS XE and ACTD. See *OpenWay Riva IR8140 IOS Upgrade Guide*.



**Warning!** The IRM-STAR/IRM-MESH is not hot swappable. However, IRM-STAR/IRM-MESH slot power down is acceptable. See [IRM-STAR/IRM-MESH Slot Power Down on IR8140 on page 28](#).



**Important!** When inserting or removing the IRM-STAR/IRM-MESH ensure you follow safe Electrostatic Discharge (ESD) and handling procedures.



**Caution:** IRM-MESH is for Mesh deployments and uses the integrated antenna instead.

**Note:** Use the same steps in this chapter when replacing a non-functioning IRM-STAR/IRM-MESH with a new IRM-STAR/IRM-MESH.

## Requirements and Materials

The following procedures in this chapter are necessary for successfully replacing an existing IRM with a new IRM-STAR/IRM-MESH.

Collect the following items before you start.

- 10mm socket wrench to loosen the IRM-STAR/IRM-MESH M6 bolts
- Laptop with USB port running PuTTY or similar terminal application. PuTTY is a terminal emulator, serial console and network file transfer application. It supports several network protocols including SCP, SSH, Telnet, rlogin and raw socket connection.

**Note:** Go to the PuTTY website to download the latest version of the application: <https://www.putty.org/>.

- Credentials for IR8140 access
- New IRM-STAR/IRM-MESH

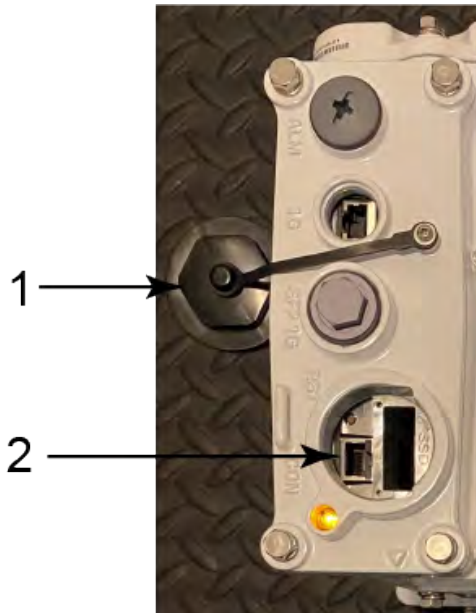
**Note:** The IRM-STAR/IRM-MESH ships in an anti-static shipping bag. Do not remove the IRM-STAR/IRM-MESH from the anti-static shipping bag until it is ready to be placed into the IR8140. Save the anti-static shipping bag for the removed IRM-STAR/IRM-MESH.

- Available Field Network Director FND operator (utility office or Itron Managed Services) to verify IRM-STAR/IRM-MESH operation
- IR8140 communications port access
- Cisco DB9–RJ45 serial cable and USB-to-Serial adapter cable
- Permanent marker

## Removing an Existing IRM-MESH/IRM-STAR

1. Remove the COM port plug cover, see item 1, to gain access to the RJ-45 console port, see item 2, located on the left hand side of the bottom of the IR8140 to gain access to the RJ45 connector.

**Figure 41** COM port removed RJ45 access





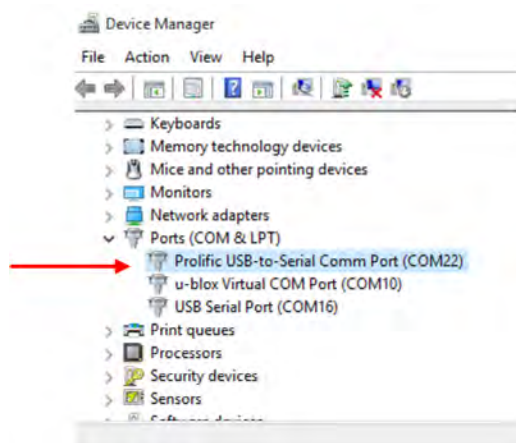
2. Locate the Cisco DB9-RJ45 Serial Cable , and the USB-to-Serial Adapter Cable. Both are shown connected in figure. The left-most blue cable is the DB9-RJ45 Serial Cable and the right-most cable is the USB-to-Serial Adapter Cable.

**Figure 42** Cisco DB9-RJ45 serial cable and USB-to-serial adapter cable



3. Plug the blue Cisco DB9-RJ45 Serial Cable, RJ45 end, into the IR8140's RJ45 Connector, see figure, that you accessed located on the right hand side top of the IR8140.
4. Open the Windows Device Manager and locate the Prolific USB-to-Serial Comm Port and assign.

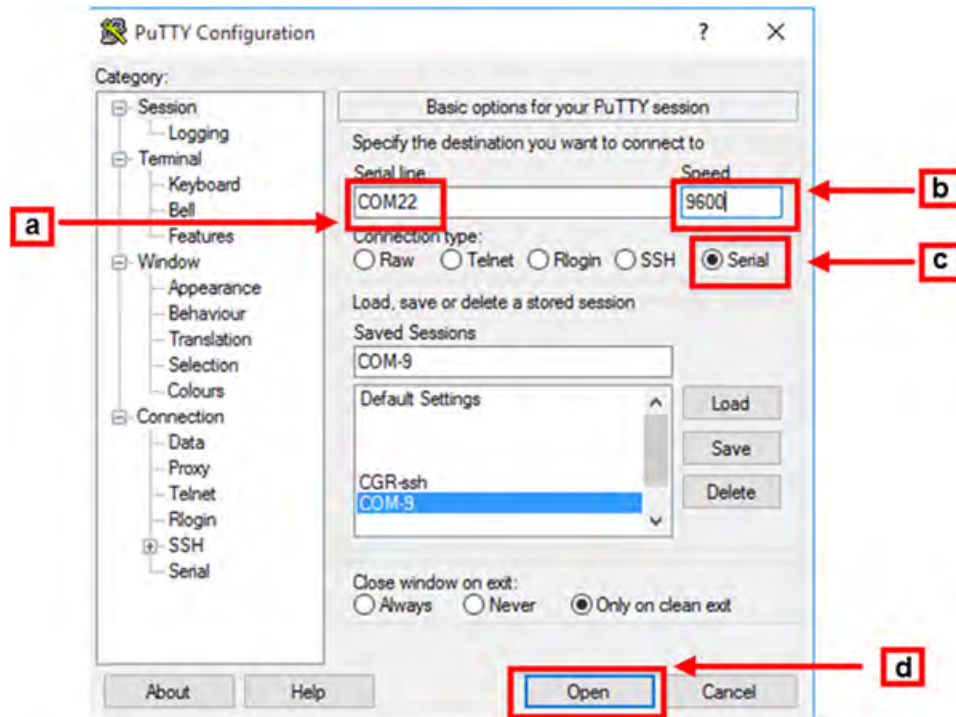
**Figure 43** Windows device manager USB to serial com port selected



5. Open a new PuTTY session, see figure, and perform the following steps:
  - a. Enter the Com Port value in the Serial Line field, see item a, COM22 shown as an example.
  - b. Set the port Speed to 9600, see item b, in the Speed field. This is the baud rate.

- c. Select Serial, see item c, in the Connection Type field.
- d. Click the Open button, see item d.

**Figure 44** PuTTY Configuration Screen



After the PuTTY application connects to the IR8140, a console terminal appears. If you do not see a console terminal prompt, press the Enter key until the console terminal prompt appears. If you still do not get a prompt, exit the PuTTY application and switch the baud rate (Speed) to a new baud rate other than 9600. Make sure that the cable is attached and undamaged.



**Important!** The IRM-MESH only fits into Slot 1 of the IR8140. In this example, the existing IRM-MESH is located in Slot 1. If your existing IRM-MESH is located in Slot 1, the same procedure applies.

7. Type `enable` at the prompt, see item 1.
8. Type the console password and press the Enter key, see item 2.

**Note:** The password for every IR8140 is different. The password does not appear on the screen. Depending on the situation, local users can be disabled when IR8140 is connected to head end. In this case use Active Directory account.

9. Type `show hw-module subslot all oir`, see item 3.

- Confirm that the Itron IRM-MESH location is shown. For example, in IR8140 Third Party Module, Module is in subslot 0/1. The Operational Status of OK indicates the IRM-MESH is powered and active.

**Figure 45** PuTTY screen - Confirm IRM-MESH slot location

```

COM22 - PuTTY
User Access Verification
Username: admin
Password:
FDO2443J8NH>enable 1
Password: 2
FDO2443J8NH#show hw-module subslot all oir 3
Module          Model          Operational Status  Battery Mode
-----
subslot 0/0     IR8140H-2x1GE  ok                  disabled
subslot 0/3     IRMH-LTE-MNA-900  ok                  disabled
subslot 0/1     Third Party Module  ok                  disabled
FDO2443J8NH# 4
  
```

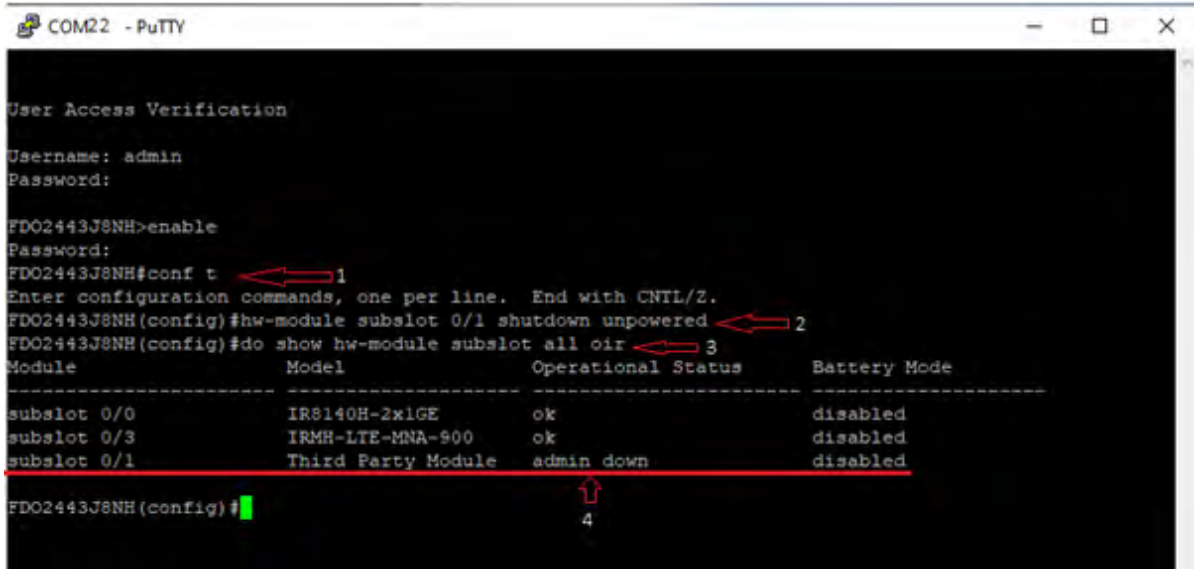


**Important!** The IRM-MESH only fits into subslot 0/1 of the IR8140. In this example, the existing IRM-MESH is located in subslot 0/1. If your existing IRM-MESH is located in subslot 0/1, the same procedure applies.

- Type `conf t` (configuration terminal). The prompt changes to `(config)`, see item 1.
- Type `hw-module subslot 0/1 shutdown unpowered` The IRM-MESH in subslot 0/1 in this example, see item 2.
- Type `do show hw-module subslot all oir`, see item 3.
- If successful, the Operational Status indicates `admin down`, see item 4.

**Note:** If powered down is not showing, verify the `(config)` shows in the prompt. If not, re-enter `conf t`. Once `(config)` shows in the prompt, issue the `hw-module subslot 0/1 shutdown unpowered` command a second time. Verify that the Operational Status is `admin down` with another `do show hw-module subslot all oir` command.

Figure 46 PuTTY Screen - Power down IRM-MESH



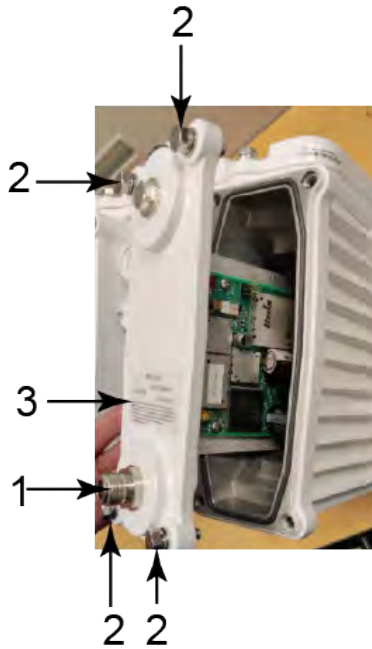
After you have powered down the existing IRM-MESH, verify its actual location.



**Important!** The IRM-MESH only fits into subslot 0/1 of the IR8140. In this example, the existing IRM-MESH is located in subslot 0/1. If your existing IRM is located in any other subslot, the same procedure applies.

15. Locate the actual Slot used by the existing IRM-MESH as identified using the PuTTY application.
16. Visually verify the Slot 1 is occupied by the existing IRM-MESH. The IRM-MESH features include: 1 N-Connector, see item 1, four M6 bolts, see item 2, and FCC sticker, see item 3.

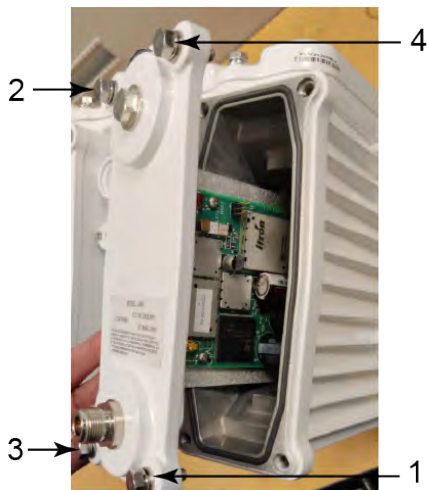
**Figure 47** IRM-MESH features



After visually verifying the existing IRM-MESH, it may be removed from the IR8140.

17. Remove the RF cable, or antenna from the N-Connectr on the IRM-MESH.
18. Loosen the four M6 bolts using the sequence shown below with a 10mm socket.

**Figure 48** Four M6 bolt loosening sequence



19. Grasp the IRM-MESH, and pull up and out to slide the IRM-MESH out of the IR8140.
20. Once the existing IRM-MESH is removed, remove the new IRM-MESH from its antistatic bag, and now place the IRM-MESH that was removed into the anti-static bag.

## Installing the New IRM-STAR/IRM-MESH

1. Insert the new IRM-STAR/IRM-MESH into the applicable Slot of the IR8140. Align the module orientation indicator with the front of the IR8140. Ensure the IRM-STAR/IRM-MESH PCBs edge connector aligns with the PCI-E 98-pin connector on the IR8140 mother board. Lightly push down on the IRM-STAR/IRM-MESH. You may need to vertically rock it to fully seat.



**Caution:** Do not force the IRM-STAR/IRM-MESH into place.

2. Tighten the four M6 bolts to 15 to 20 in-lbs in the proper sequence using a 10mm socket and torque wrench.
3. Attach the RF cable or antenna to the N-Connector on the IRM-STAR/IRM-MESH as needed.
4. Connect the IR8140 to the AC Power and to the network.
5. Re-enable the BBUs using the applicable commands.

While replacing the IRM-STAR/IRM-MESH, the IR8140 may have automatically logged you out. The IR8140 automatically logs out the user after 10 to 15 minutes of inactivity. Log back on to the IR8140 and return to the (config) prompt as described earlier.



**Important!** The IRM-MESH only fits into subslot 0/1 of the IR8140, and IRM-STAR into subslot 0/2. In this example, the existing IRM is located in subslot 0/1.

6. At the config prompt, enter `no hw-module subslot 0/1 shutdown unpowered`, see item 1.
7. At the config prompt, enter `do show hw-module subslot all oir`, see item 2.
8. Verify that the new Operation Status indicates OK, see item 3.

**Figure 49** PuTTY screen - IRM-STAR/IRM-MESH status

```

COM22 - PuTTY
FDO2443J8NH(config)#no hw-module subslot 0/1 shutdown unpowered ← 1
FDO2443J8NH(config)#do show hw-module subslot all oir ← 2
Module          Model          Operational Status  Battery Mode
-----
subslot 0/0     IR8140H-2x1GE  ok                  disabled
subslot 0/3     IRMH-LTE-MNA-900  ok                  disabled
subslot 0/1     Third Party Module  ok                  disabled
FDO2443J8NH(config)#
FDO2443J8NH(config)#
  
```

After PuTTY connects to the IR8140, a console terminal appears. If you do not see a terminal prompt, press Enter until the terminal prompt appears. If you still do not get a prompt, exit PuTTY and switch to another baud rate other than 9600.

**Note:** Make sure that the cable is attached and undamaged.

9. Type `enable` at the prompt.
10. Type the console password and press Enter.
11. At the config prompt, enter `end` to return to the original command prompt, see item 1.
12. Enter `copy running-config startup-config` at the prompt, see item 2.
13. When prompted for Destination filename, enter `startup-config` and press Enter, see item 3.
14. Type `exit` at the prompt.
15. Call your local Field Network Director (FND)/ Cisco Grid Network Management System (CGNMS) FND/CGNMA operator to confirm IRM-STAR/IRM-MESH operation. When operation is confirmed, you can unplug the console cable.

**Figure 50** PuTTY screen - IRM-STAR/IRM-MESH end

```

COM4 - PuTTY
FDO2443J8NH(config)#do show hw-module subslot all oir
Module           Model           Operational Status  Battery Mode
-----
subslot 0/0      IR8140H-2x1GE   ok                  disabled
subslot 0/3      IRMH-LTE-MNA-900 ok                  disabled
subslot 0/1      Third Party Module ok                  disabled

FDO2443J8NH(config)#end
FDO2443J8NH#copy running-config startup-config
Destination filename [startup-config]?
Building configuration...
[OK]
FDO2443J8NH#
  
```

16. Remove the old IRM-STAR/IRM-MESH compliance label from the IR8140. If peeling off the label is unsuccessful, use a permanent marker to mark through the FCC and IC IDs, as they are no longer valid.
17. From a Putty session to the IR8140, type the following command to verify that IOx is running with the IR8140:

Show iox

EXAMPLE OUTPUT

```
FDO2443J8NH#show iox
```

IOx Infrastructure Summary

```

-----
IOx service (CAF) :Running
IOx service (HA) :Not Supported
IOx service (IOxman) :Running
IOx service (Sec storage) :Running
  
```

```
Libvirtd 5.5.0 :Running
```

```
Dockerd v19.03.13-ce :Running
```

18. If actd version 5.0.1 is already running in IR8140, no need to remove it and install it again. If not running or was removed, then you need to install actd version 5.0.1 using IOS cli commands provided below.

```
app-hosting install appid actd package flash:app-actd-ver-5.0.1.tar
```

```
show app-hosting list
```

```
app-hosting activate appid actd
```

```
show app-hosting list
```

```
app-hosting start appid actd
```

```
show app-hosting list
```

19. Clean the surface and affix the regulatory label (included in the IRM-STAR/IRM-MESH installation kit) to the front bottom right of the exterior of the IR8140 shown in the figure.

**Figure 51** Update the FCC regulatory label



The following line should be included on the label:

For IRM-MESH - Contains: FCC ID: SK9OW1

For IRM-STAR - Contains: FCC ID: EO9OW3



## Changing the IPv6 Prefix Address of the IR8140

**Note:** The following example is for replacing an installed IRM-MESH with a IRM-MESH. However, changing the IPv6 Address also applies when: replacing IRM-MESH with IRM-STAR, replacing IRM-MESH with another IRM-MESH, and replacing IRM-STAR with another IRM-STAR.

When replacing a IRM-MESH with a IRM-MESH in a field deployed situation, you must change the IPv6 Prefix Address of the IR8140 at the Dynamic Host Configuration Protocol (DHCP) server to ensure proper communication with the Battery Powered Devices (BPDs) and Main Powered Devices (MPDs) within the Mesh.

If you do not change the IPv6 Address, after the IRM-MESH is installed, it retains the old Personal Area Network Identifier (PAN ID) and Service Set Identifier (SSID). When this occurs, communication is lost with the Battery Powered Devices (BPDs) and Main Powered Devices (MPDs) within the Mesh.

**Note:** Steps 1 through 3 do not affect the service, and should be done anytime before replacing the IRM-MESH and upgrading the IR8140.

1. Verify that each device in the IRM-MESH cell is registered with Field Network Director (FND) and in an Up state.
2. Upgrade the IR8140's IOS-XE to 17.09.03 via the FND, using the following commands. Navigate to **Config** --> **Firmware Update**, select the **Firmware Update Group** in which the IR8140 resides, click the **Upload Image** button. From the **Upload Image** box, choose IOS-XE-IR8100 from the **Select Type** drop-down box, choose ir8100-universalk9.17.09.03.SPA.bin from the **Select an Image** drop-down box, and click the **Upload Image** button.
3. Create a new IPv6 prefix in DHCP server using either CPNR, or Infoblox as detailed here:
  - a. On the CPNR DHCP server, create a Prefix that uses the new IPv6 base address that is to be used by the IRM-STAR once it is provisioned. Assigning a new IPv6 base address causes the IRM to acquire a new IPv6 address and forces the IRM to acquire a new PAN ID and causes all of the devices in the PAN to reauthenticate.

**Note:** If you are unfamiliar with this process, please contact your Itron representative for assistance.

- b. In Infoblox DHCP server, go to **Data Management > IPAM** and add the new IPv6 Network to be used by the IRM-MESH once it is provisioned.

**Note:** If you are unfamiliar with this process, please contact your Itron representative for assistance.

**Note:** The following steps affect your mesh service and should be executed just before starting to replace the IRM-MESH and upgrading the IR8140.

3. Delete the IRM-MESH from the FND before you add the IRM-MESH using the FND commands. Navigate to **Devices > Field Devices > Select CAM1** (check the box next to the IRM) > **More Action > Remove Devices**.

4. Import the IRM-MESH into the FND using the FND commands. Navigate to **Devices > Field Devices > Add Devices**. Browse to the directory where the Import file for the IRM-MESH is located, select it and click **Add**.
5. Edit the existing IR8140 FND Import Comma-Separated Values (CSV) file and update it with the new IPv6 Prefix in the following fields: meshPrefixConfig, meshAddressConfig, gosGwyV6Address (or ioxGwyV6Address). Then update the IR8140 properties in FND using the following commands. Navigate to **Devices > Field Devices > Bulk Operations > Change Device Properties**. Browse to the directory where the updated IR8140 Import file for the IR8140 is located, select it and click **Change**.
6. Open **Config Properties** tab in **Devices > Field Devices > IR8100 Device** info page to verify that Prefix Config, IP Address Config and IOx Node Gateway IPv6 Address is changed reflecting the new IPv6 Prefix.
7. Check the new IPv6 prefix is updated in the IR8140 configuration using the IR8140 CLI `show ipv6 int L0`. Under Global unicast address(es) verify that the listed IPv6 address and subnet were derived from the new IPv6 base address that was entered into the CNR, or Infoblox in Step 3.

**Note:** You can also verify the IPv6 Prefix is updated in the FND **FND IR8100 info > Running Configuration** tab.

8. From FND, Verify that the IRM-MESH is properly registered with the FND with the new PAN ID and that all endpoints are visible in the routing tree.
9. Verify that a mesh network forms under the newly installed and configured IRM. May take hours to days to complete.

## Updating the Data Rate and Network Security for IRM-STAR

The type of firmware loaded on to the IRM-STAR and the Battery Powered Devices (BPDs) at the factory dictates the IRM-STAR and BPDs data rate.

- **GSR 5.3 Firmware Set:** IRM-STAR Modules or the BPDs that are ordered with the GSR 5.3 firmware set will have an option to be either on the 10kbps or the 25kbps data rate. Also, turning the Network Security “On” or “Off” is optional with the 25kbps Data Rate selection.

**Table 21** IRM-STAR data rate & security parameters

Firmware Set	Data Rate	Network Security
GSR 5.3	25kbps	ON
	25kbps	OFF
	10kbps	ON

For any existing field deployments, in the Star configuration, that need to be upgraded to operate at 25kbps data rate, then perform the following steps:

- If the existing deployment is functioning using CAM3S modules, but at 10kbps data rate, then the firmware of these CAM3S modules need to be upgraded to the GSR 5.3 firmware set loaded on them with appropriate data rate and network security settings.
- If the existing deployment is functioning using IRM-STAR modules, but at 10kbps data rate, then the firmware of these IRM-STAR modules need to be upgraded to the GSR 5.3 firmware set loaded on them with appropriate data rate and network security settings.
- Firmware of all the associated BPDs in the deployment should also be upgraded to the GSR 5.3 firmware with appropriate data rate and network security settings IRM-STAR or CAM3S and the BPD firmware upgrade versions should be aligned.

Recommended firmware selections for the 25kbps data rate are:

- For IRM-STAR: 428935-010 - HW4.1 OPENWAY RIVA PIM IRM-STAR FIRMWARE SET FOR SYSTEM RELEASE 5.3, ACT COMMS RF, DAVINCI MR1 STAR (PRODUCT SECURE) with IOS EX 17.9.1 (GSR 5.3 STAR - Network Security OFF & 25K Data Rate).
- For BPDs (500G, 500W, OWR-GRD): Please refer to the *OpenWay Riva GSR 5.3 System Release Notes* (815-0412-00), *Intelis Gas Meters Release Notes* (815-0419-00), *500W ERT<sup>®</sup> Modules Release Notes* (815-0418-00), and *500G ERT<sup>®</sup> Modules Release Notes* (815-0417-00).

## Updating the Data Rate and Network Security for IRM-MESH

IRM-MESH will not present a selectable option for the Data Rate. Also, the Network Security will always be “ON” for a IRM-MESH.

# A Specifications

The following table lists the technical specifications.

**Table 22** IRM-STAR/IRM-MESH technical specifications

Type	Items	Details		
Connectors	RF	1 - antenna port, Type N female		
Communications	Frequency Hopping Spread Spectrum	Depending on regulatory domain and mode For USA/Canada: 512 channels Number of channels will vary for other countries and regions.		
	RF Band	915MHz ISM		
	RF Operational Bands (Riva)	Frequency Range*	902 to 928MHz	
		Radio Output Power*	500mW to 1W	
	RF Modulation Options - IRM-STAR	GFSK	10kbps	
		GFSK	25kbps	
	RF Modulation Options - IRM-MESH	FSK	50kbps	
		FSK	150kbps	
		OFDM	200kbps	
		OFDM	600kbps	
DSSS		6.25kbps		
DSSS		12.5kbps		
Physical Dimensions	IRM-STAR/IRM-MESH	7.4cm H x 19.0cm W x 16.8cm D, (2.9" H x 7.47" W x 6.63" D)		
Operating Conditions	Temperature	-25°C to +70°C (-40°F to +158°F)		
	Relative Humidity	5% to 95% non-condensing		
	Shock	IEC 68-2-31, operating, 50mm		
	Vibration	IEC 68-2-31 to levels from IEC 721-3-2		

**Table 22** IRM-STAR/IRM-MESH technical specifications (continued)

Type	Items	Details
Non-Operating Conditions	Temperature	-25°C to +70°C (-40°F to +158°F)
	Relative Humidity	5% to 95% non-condensing
	Altitude	3014m (10,000 feet); maximum operating temperature is derated with increasing altitude per IEEE 1613a-2008
Weight	IRM-STAR	861.8g, (1.9Lbs.)
	IRM-MESH	498.9g, (1.1Lbs.)
Agency Approvals	FCC parts 1, 2, and 15, Class B	
	Canada ISED (Innovation, Science and Economic Development) Compliance	
	ISED RSS 102, RSS 210, RSS 247 and RSS GEN	
* Frequency Range and Radio Output Power vary depending on what country or region the device is configured for.		

# B

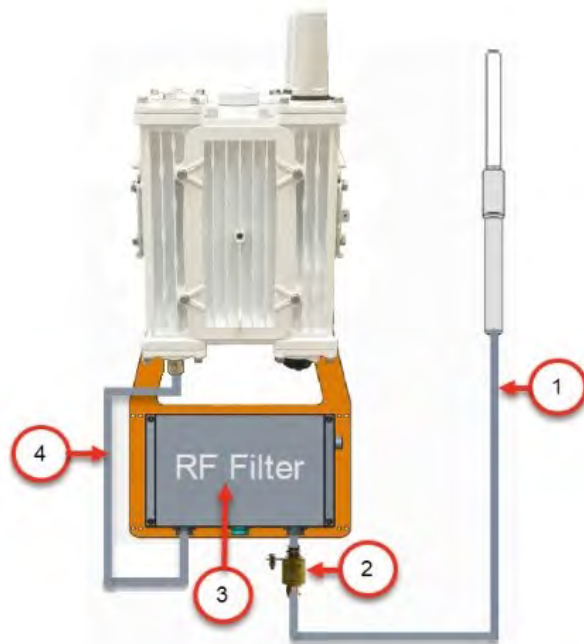
## RF Filter Installation

This section describes installing a RF Filter to an existing pole-mounted IR8140 using the remote antenna option. To install the IR8140, refer to the IR8140 installation procedure in the *Cisco Catalyst IR8100 Heavy Duty Series Router Installation Guide*.

**Note:** Depending on the geographic region where the IR8140 is installed, a RF filter may be required with a remote antenna. A RF filter is required for installations in Australia, and other locations. A RF filter is not required for installations in North America. See [Australia Applications on page 74](#).

Standard height remote antennas are mounted directly above the IR8140 (3–5 feet above the IR8140) and connected to the RF Filter with a remote RF cable. Remote antennas can be mounted at an extended height above the IR8140. The coaxial RF cable from the RF Filter to an antenna mounted at an extended height will be locally sourced to the required length needed for specific antenna mounting locations ( $\frac{1}{2}$ " superflex is recommended for extensions less than 35 feet).

This figure shows the remote antenna and RF filter connected to a IRM-STAR. Specifically, shows the RF Cable, see item 1, that connects between the RF Filter and the Antenna, the Lightning Arrestor, see item 2, the RF Filter, see item 3 and the RF Cable, see item 4, that connects between the IRM-STAR's N-Connector and the RF Filter.

**Figure 52** RF Filter installation configuration

## Placement Guidelines for Remote Antenna

Antenna placement is one of the most important factors in determining overall system performance. Careful consideration must be given to proper antenna placement. Follow these general guidelines when determining the ideal location for a remote-mounted remote antenna:

- Mount the antenna vertically.
- Mount the antenna in a location where there is a clear, unobstructed, 360-degree view of the horizon. The antenna receives and transmits in all directions. Objects like building walls, nearby metal surfaces, or other obstructions might interfere with the proper operation of the antenna.
- Do not mount the antenna on a rooftop where nearby buildings are higher than the installation location.
- Do not mount the antenna near existing RF radiating antennas. If existing RF radiators are nearby, the horizontal separation distance to the radiator must be a minimum of 30 meters and/or three meters of vertical separation. In instances where nearby RF radiators are present, conduct an inter-modulation interference study to evaluate the potential for interference and any effects it may have on system performance. Consult your Itron systems engineer for more information.

- Height is preferred for optimal performance. Itron recommends installing the antenna no higher than 30 meters.



**Caution:** Do not install a 5.5/5.15 dBi antenna directly on the IR8140. Antenna installation directly on the IR8140 will compromise mechanical integrity and will not meet the compliance requirements. See [915MHz 5.5dBi Remote Antenna Kit on page 21](#).



**Caution:** Do not install a 8.15 dBi antenna directly on the IR-8140. Antenna installation directly on the IR8140 will compromise mechanical integrity and will not meet the compliance requirement for a loss of 2.2dB (for any exceptions, ensure you read this entire section), between the RF filter and the 8.15 dBi antenna. See [915MHz 8.15dBi High Gain Remote Antenna Kit on page 22](#).

A side arm antenna installation must be done if the antenna is mounted where it does not have an unobstructed 360-degree view. Refer to the following guidelines for a side arm antenna installation:

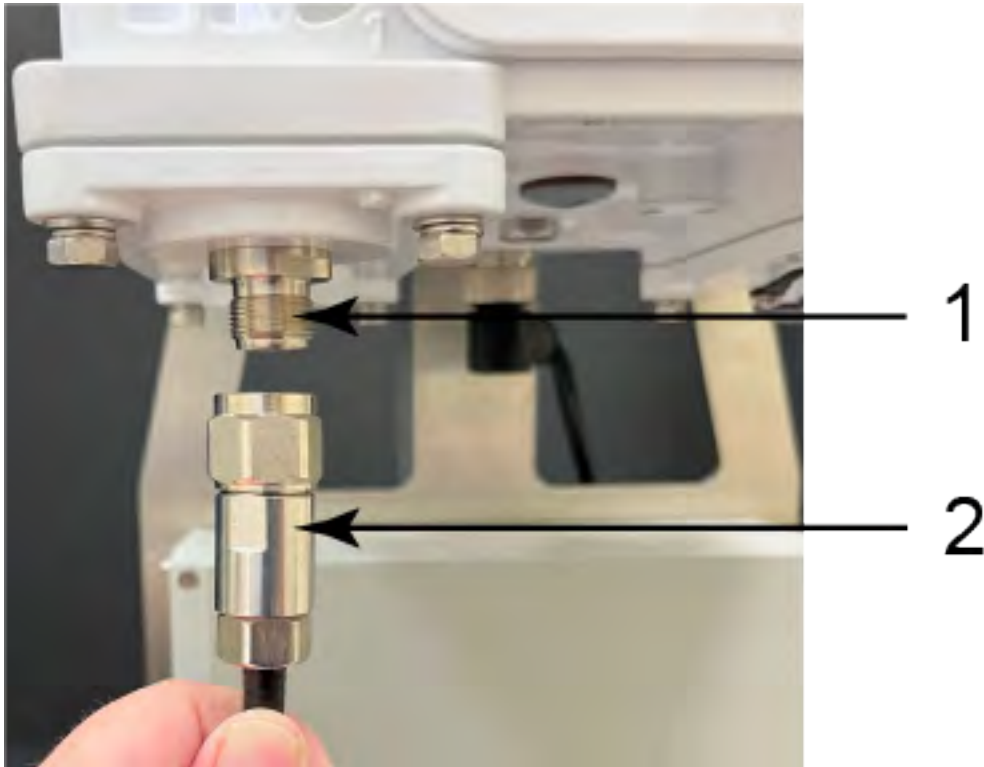
- The minimum standoff distance is 60 centimeters, where the interfering structural members are 10 centimeters or less in diameter and spaced more than two meters apart.
- For structural members between 10 and 25 centimeters in diameter, use a sliding scale of 0.6 to 1.5 meters. (For example, a 60-centimeter standoff at 10-centimeter diameter to a 150-centimeter standoff at 25-centimeter member diameter.)

## Connecting a RF Filter

1. Connect one end of the RF Cable, see item 2, coming from the RF Filter to the N-Connector, see item 1, located on the IRM-STAR/IRM-MESH in slot 1 on the bottom of the IR8140.



**Figure 53** RF filter to IRM-STAR/IR-MESH connection



2. Connect the other end of the RF Cable, see item 1, to the N-Connector on the bottom of the RF Filter.

**Figure 54** RF filter to IRM-STAR/IRM-MESH connection - Bottom



## Australia Applications

To meet regulator requirements in Australia for the IRM-STAR or IRM-MESH in either a Star or Mesh deployment, ensure you comply with either of the following configurations:

1. Use the 915MHz 2.8dBi WPAN antenna on the IR8140 for IRM-MESH.
2. Use the 915MHz 5.5dBi or 915MHz 8.15dBi remote antenna with the RF Filter for IRM-STAR.



**Caution:** For Australia the required minimum loss between the IR8140/IRM and 8.15dBi antenna is 2.2dB in addition to the required RF Filter and the supplied cable between the IR8140 and the RF Filter.

Additionally, Itron recommends, you select a backhaul cellular provider that does not operate in the passband of the IRM-STAR/IRM-MESH, as this results in desensing the IRM's receiver as the two antennas are so close together.



# Replacing the Alignment Guide Pin and Lock Washer

This section only applies if installing either the IRM-STAR or the IRM-MESH device into a slot that has an alignment guide pin and lock washer.

The alignment guide pin interferes with the IRM-STAR or the IRM-MESH shield. Therefore, the alignment guide pin and the lock washer need to be replaced with a screw.



**Important!** To maintain Cisco warranty coverage, this procedure can only be performed by Itron personnel.

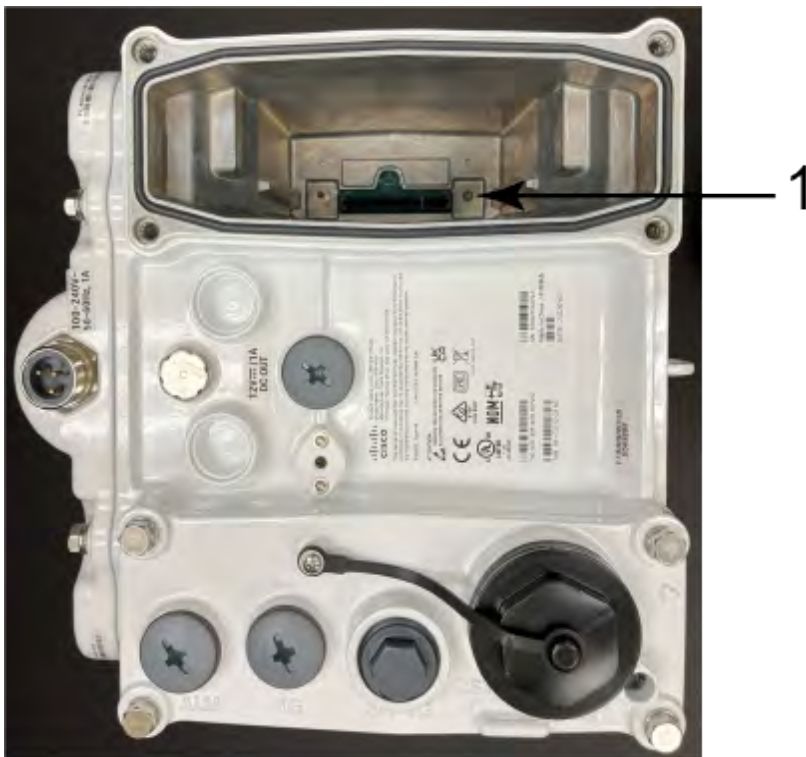


**Caution:** Ensure that you are working in a static-free environment. Electrostatic discharge (ESD) can damage components.

**Table 23** Items used

Item	Part Number
IR8140	
Torx screw with nylon patch, M3.5 x 0.6 length 8mm	420-1207-00
Magnetic retriever	McMaster-Carr 7385A44 or equivalent
T-10 Torx driver 6" length	McMaster-Carr 7396A52 or equivalent
Torque driver calibrated to 8-10 in. lbs.	
3/16" Standard socket	

1. Place the IR8140 in horizontal position.

**Figure 55** IR8140 position**Figure 56** Alignment guide pin location

2. Use 3/16" socket driver as shown to remove the alignment guide pin and washer, item 1 in slot 1 only. The washer is intended to come off with the alignment guide pin. The socket might hit the connector in the slot. Ensure not to damage any other components.

**Figure 57** Removing the alignment guide pin



**Figure 58** Alignment guide pin removed



3. Check that the washer is removed. If not, remove the washer using a magnetic retriever.

**Figure 59** Magnetic retriever



**Important!** Ensure that neither the alignment guide pin or the washer accidentally fall into the IR8140 slot and carefully discard them both.

4. Use the Torx screwdriver to insert the screw inside the slot to 8-10 in. lbs. torque.

**Figure 60** Torx screwdriver



**Figure 61** Inserting the screw



5. Ensure the screw is properly inserted and seated properly.

**Figure 62** Screw inserted properly



# Glossary

## A

### **Adaptive Communications Technology (ACT)**

A technology that incorporates both radio frequency (RF) and power line communication (PLC) onto one chip set. Adaptive Communications Technology (ACT) allows an endpoint to dynamically change its communication media and modulation to the fastest and most reliable available, based on its location, network operating conditions, and the criticality of the application data.

### **Advanced Meter**

An electric meter that is capable of measuring and recording usage data in time differentiated registers, including hourly or such interval as is specified by regulatory authorities. The meter allows electric consumers, suppliers and service providers to participate in all types of price-base demand response programs. Also, the meter provides other data and functionality that address power quality and other electricity service issues.

## B

### **Battery Backup Unit (BBU)**

The battery provides power to the IR8140 if AC power is lost or not available. The IR8140 supports up to three units.

### **Battery Powered Device (BPD)**

Devices powered by long-lasting batteries, as opposed to mains powered devices (MPDs), which receive power from a wired electrical connection.

## F

### **Field Deployment Manager (FDM)**

A meter/endpoint installation and workforce management software solution. FDM supports safe, efficient deployment and maintenance of meters, endpoints, and metering network equipment; automates endpoint programming; electronically captures and validates installation data, reducing errors and site revisits; ensures network connectivity; captures field images and GPS coordinates; and creates work orders for service and quality audit work orders. It includes optional invoicing and inventory management modules.

### **Firmware**

The computer program stored in a read-only memory (ROM) or an erasable programmable read-only memory (EPROM) integrated circuit.

## I

### **Industrial Rounter Module (IRM)**

A module that enables meters and grid devices equipped with Adaptive Communications Technology (ACT) to communicate with each other while dynamically switching between radio frequency (RF) and power line communication (PLC).

### **Internet Protocol (IP)**

Refers to the core protocol that defines the basic packet structure for transport over the internet.



**Internetwork Operating System Extended Edition (IOS XE)**

Cisco IOS XE is a software made by Cisco for use on various hardware devices such as networking routers and switches. A command-line interface governs a series of “trains” defined as tools for delivering Cisco software to specific platforms.

**L****Lighting Arrestor**

A device used to protect the insulation and conductors of the system from damaging effects of lightning.

**M****Mesh Network**

A network topology in which there are nodes that participate in the relaying of information from other nodes, generally in a peer-to-peer environment. This would include protocols that support self-organizing, self-discovery networks. It provides the greatest amount of redundancy, so in the event that one node fails, network traffic can be redirected to any other node.

**O****OpenWay Operation Center - Collection Manager (OWOC-CM)**

An OpenWay Operations Center (OWOC) application. Collection Manager (CM) manages high-volume, secure communications to support the configuration and firmware management of electric, gas, and water devices, data collection, and remote service connect and disconnects. It provides the ability to manage recurring job scheduling and optional data storage for operational reporting. It incorporates integrated mapping support to provide geospatial context of devices and key performance indicator reporting (KPIs) for read rates and non-communicating meters.

**R****Radio Frequency (RF)**

Refers to a wireless electromagnetic signal used as a form of communication. Radio waves are a form of electromagnetic radiation with identified radio frequencies.

**S****Smart Meter**

A term used to refer to an advanced meter. See Advanced Meter.

**Star Network**

A star network is an implementation of a spoke–hub distribution paradigm in computer networks. In a star network, every host is connected to a central hub. In its simplest form, one central hub acts as a conduit to transmit messages.

**System LED**

The System Light-Emitting Diode (LED) signals AC power is applied when the green LED is lit.

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