

# Release Notes for the Cisco LoRaWAN Gateway, Release 2.3.1

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## Release Notes for the Cisco LoRaWAN Gateway, Release 2.3.1

These release notes include important information about Cisco LoRaWAN Gateway Software Release 2.3.1 and the limitations, restrictions, and caveats, if any, that apply to this release.



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**Note** The Cisco LoRaWAN Gateway was previously named Cisco LoRaWAN Interface Module.

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**Note** Currently, Actility LRR users should remain on the 2.2.0 release. The 2.3.0 release and later should be used for users who desire the new functionality described in this document.

Actility ThingPark LRR version 2.6.53 is supported for IXM firmware version 2.2.0.

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## Introduction

The Cisco LoRaWAN Gateway is one of the Cisco Internet of Things (IoT) extension module series. It can be connected to the Cisco 809 and 829 Industrial Integrated Services Routers (IR800 series) for virtual mode or standalone for low-power wide-area (LPWA) access and is positioned as a carrier-grade gateway for outdoor deployment, including harsh environments. It adds a ruggedized remote LoRaWAN radio modem interface to create a gateway between the Cisco Field Network Director and a partner's LoRa network server.



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**Note** Currently, Cisco LoRa IXM only supports Actility Thingpark Packet Forwarder or long range relay (LRR), in production, or the Common Packet Forwarder (CPF). CPF enables LoRaWAN gateway as an open platform to operate with the open source LoRa Network Servers implementing Semtech Basic Station.

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There are two LoRaWAN gateway modes as below:

- Virtual interface mode – IR800 series including the LoRaWAN module as a virtual interface
- Standalone mode – The LoRaWAN module working alone as an Ethernet backhaul gateway

You can configure the LoRaWAN IXM running on virtual interface mode or standalone mode through CLI or IoT FND. For more information, see the [Cisco Wireless Gateway for LoRaWAN Software Configuration Guide](#).



**Note** The Common Packet Forwarder (CPF) feature is only supported in standalone mode.

## System Requirements

### Hardware Supported

Model No.	Description
IXM-LPWA-800-16-K9	Cisco LoRaWAN Gateway, IoT extension module series, radio spectrum from 863–870 MHz, 16 LoRa channels, IP67
IXM-LPWA-900-16-K9	Cisco LoRaWAN Gateway, IoT extension module series, radio spectrum from 902–928 MHz, 16 LoRa channels, IP67

### Software Images

Filename	Description
ixm_mdm_i_k9-2.3.1.tar.gz	Cisco LoRaWAN Gateway OS Image Version 2.3.1 with Semtech Basic Station Release Version 2.0.5 FPGA Version 61 HAL Version 5.1.0

## Installation of a New Software Release

For both standalone mode and virtual mode, after you upgrade the LoRaWAN gateway to Release 2.0.30, you can only downgrade to Release 2.0.20. Downgrading to releases earlier than 2.0.20 is not supported. For example, from Release 2.0.30 to Release 2.0.11, or from Release 2.0.30 to Release 2.0.10, is not supported..

To upgrade to Release 2.0.x, any older versions must first be upgraded to Release 1.0.20. For example, Release 1.0.4, 1.0.5, or 1.0.6 has to be upgraded to 1.0.20 first and then upgraded to Release 2.0.x. From 2.0.x, the gateway can be upgraded to 2.3.0 and later versions.

### Firmware Upgrade From Standalone Mode



**Note** We assume that you have the latest FPGA v61. If you have loaded any recent release on the IXM, use the **show inventory** command to check the FPGA status. If the FPGA version is not 61, upgrade first with an image that has FPGA v61.

Refer to the release support matrix on various FPGA version and LRR version support.

Follow these steps to install a new software image on the standalone mode LoRaWAN Gateway:

## Procedure

**Step 1** Log into the Cisco LoRaWAN Gateway through the console port, or SSH if configured.

**Note** The console port is 115.2kbps.

**Step 2** Check the current version before upgrade.

### Example:

```
IXM#show version
```

```
Cisco LoRaWAN Gateway Software, Version 2.3.1, RELEASE SOFTWARE
Technical Support: http://www.cisco.com/techsupport
Copyright (c) 2012-2022 by Cisco Systems, Inc.
Compiled by Cisco LoRaWAN Gateway Team
```

```
ROM: Bootstrap program is Cisco LoRaWAN Gateway boot loader
Firmware Version (Active) : 2.3.1, RELEASE SOFTWARE
Firmware Version (Backup) : N/A (<2.3.1.0), RELEASE SOFTWARE
Bootloader Version: 20180130_cisco
```

```
Hostname:IXM uptime is 1 week, 4 days, 3 hours, 11 minutes
Using secondary system image
```

```
This product contains cryptographic features and is subject to United
States and local country laws governing import, export, transfer and
use. Delivery of Cisco cryptographic products does not imply
third-party authority to import, export, distribute or use encryption.
Importers, exporters, distributors and users are responsible for
compliance with U.S. and local country laws. By using this product you
agree to comply with applicable laws and regulations. If you are unable
to comply with U.S. and local laws, return this product immediately.
```

```
A summary of U.S. laws governing Cisco cryptographic products may be found at:
http://www.cisco.com/wwl/export/crypto/tool/stqrg.html
```

```
If you require further assistance please contact us by sending email to
export@cisco.com.
```

```
cisco model: IXM-LPWA-900-16-K9
Processor : ARMv7 Processor rev 1 (v7l) with 1026516K bytes of memory.
Last reset from power-on
```

```
Base ethernet MAC Address : 00:50:43:64:2D:26
Model revision number: : F0
System serial number: : FOC242145K5
```

```
IXM#
```

**Step 3** Download the image file to the Cisco LoRaWAN Gateway from a TFTP server or from a USB device, and install the image.

**Note** To download the firmware from an USB device, you should first enable the USB support by executing the **usb enable** command.

Use the following command to download and install the firmware.

```
#archive download-sw firmware{/factory|/normal [ /save-reload|/force-reload] }
path
```

- **/factory** – Upgrade the firmware and delete user data.
  - Note** Exercise caution when using the **/factory** option with this command, because it erases everything and brings back to factory default.
- **/normal** – Upgrade the firmware and keep user data.
- **/save-reload** – Save the current configuration if required and reload the system after successful upgrade.
- **/force-reload** – Do not save the current configuration and reload the system after successful upgrade.
- **path** - The location of the file, which can be `usb:`, `tftp`, `ftp`, or `flash`:

**Note** When upgrading from 2.0.32 or prior to 2.1.0.2 or later with **/normal** option, you need to upgrade it TWICE, which will synchronize the primary and backup images to the same version. Same method applies to downgrading from 2.1.0.2 or later to 2.0.32 or prior as well to keep the primary and backup images in sync.

**Note** If the factory upgrade option is used, the twice upgrade is not required.

#### Example:

```
IXM#archive download-sw firmware /factory /force-reload flash:ixm_mdm_i_k9-2.3.1.tar.gz
Unsaved configuration will not be saved
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Copy 87337565 bytes took 00:00:03 [hh:mm:ss]
Validating archive...
Validation successful
Extracting images...
Extracted images successfully
Verifying images...
Cross checking versions...
Performing secure image validation...
```

**Step 4** After the image is installed successfully, verify the status.

#### Example:

```
IXM#show version
Cisco LoRaWAN Gateway Software, Version 2.3.1, RELEASE SOFTWARE
Technical Support: http://www.cisco.com/techsupport
Copyright (c) 2012-2022 by Cisco Systems, Inc.
Compiled by Cisco LoRaWAN Gateway Team
```

```
ROM: Bootstrap program is Cisco LoRaWAN Gateway boot loader
Firmware Version (Active) : 2.3.1, RELEASE SOFTWARE
```

```
Firmware Version (Backup) : N/A (<2.3.1.0), RELEASE SOFTWARE
Bootloader Version: 20180130_cisco
```

```
Hostname:IXM uptime is 1 week, 4 days, 3 hours, 11 minutes
Using secondary system image
```

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If you require further assistance please contact us by sending email to [export@cisco.com](mailto:export@cisco.com).

```
cisco model: IXM-LPWA-900-16-K9
Processor : ARMv7 Processor rev 1 (v7l) with 1026516K bytes of memory.
Last reset from power-on
```

```
Base ethernet MAC Address : 00:50:43:64:2D:26
Model revision number: : F0
System serial number: : FOC242145K5
```

```
IXM#
```

**Step 5** Check the FPGA status using the following command:

**Example:**

```
IXM#show fpga
INFO: SPI speed set to 2000000 Hz
checking FPGA version...
FPGA version: 61
HAL version: 5.1.0
SX1301 #0 version: 103
SX1301 #0 chip ID: 1
SX1301 #1 version: 103
SX1301 #1 chip ID: 1
##PASS: FPGA version check OK
IXM#
```

## Virtual Mode Installation



**Note** Before upgrading to Release 2.0.x from Release 1.0.x, make sure you have the FPGA v58 properly installed. The FPGA upgrade will be triggered once the IXM boots up with the image version 1.0.20. After 10 - 15 minutes, you can use the following command to check the FPGA version. Do not install the packet forwarder software or perform radio related configuration while the FPGA is upgrading or downgrading.

```
IR829_1#show virtual-lpwa 3 modem info
Name : Virtual-LPWA 3
```

```

ModemImageVer : 2.3.1
BootloaderVer : 20180130_cisco
ModemAgentVer : 1.02
SerialNumber : FOC23126GDH
PID : IXM-LPWA-800-16-K9
UTCtime : 19:04:09.033 UTC Thu Mar 04 2022
IPv4Address : 192.168.100.2
IPv6Address : none
FPGAVersion : 61
TimeZone : PST
LocalTime : Thu Mar 4 11:04:09 PST 2022
ACT2 Authentication : PASS
ModemVersionID : V01
ProtocolVersion : 2
ChipID : LSB = 0x306b0a14 MSB = 0x00f14200
LoRaSerialNumber : FOC22433QLK
LoRaCalc :
<135,122,114,106,98,94,90,86,77,69,60,52,43,39,35,31-142,130,122,114,106,102,98,94,85,77,69,60,52,48,44,40>
CalTempCelsius : 40
CalTempCodeAD9361 : 97
RSSIOffset : -202.16,-202.99
AESKey : Unknown

```

Follow this procedure to upgrade to Release 2.3.1:

## Procedure

- 
- Step 1** Log in to the IR809 or IR829 system with terminal through SSH or Console.
  - Step 2** Copy the image file into IR809 or IR829 from your host, and the image will be stored in flash.

### Example:

```

IR829_1#copy scp: flash:
Address or name of remote host [171.69.181.77]?
Source username [admin]?
Source filename [/tftp/ixm_mdm_i_k9-2.3.1.tar.gz]?
Destination filename [ixm_mdm_i_k9-2.3.1.tar.gz]?
WARNING!!!
READ THIS BEFORE ATTEMPTING TO LOGON

```

This System is for the use of authorized users only. Individuals using this computer without authority, or in excess of their authority, are subject to having all of their activities on this system monitored and recorded by system personnel. In the course of monitoring individuals improperly using this system, or in the course of system maintenance, the activities of authorized users may also be monitored. Anyone using this system expressly consents to such monitoring and is advised that if such monitoring reveals possible criminal activity, system personnel may provide the evidence of such monitoring to law enforcement officials.

Cisco Acceptable Use Policy:  
<http://www.in.cisco.com/c/cec/organizations/security-trust/infosec/policies.html>

Password:

- Step 3** (Optional) If you are upgrading from an older version to Release 1.0.20, the upgrade will result in updating the FPGA to version 61. After upgrading the image, no action should be taken while the FPGA is upgrading. You must wait until you get the upgrade status of Ready, as the following example shows.

**Example:**

```
IR829_1#show virtual-lpwa 10 modem status
Name : Virtual-LPWA 10
Status : Running
Uptime : 6:27:03.500000
Door : DoorClose
Upgrade Status : Ready
```

```
IR829_1#
```

```
IR829_1#show virtual-lpwa 3 modem info
Name : Virtual-LPWA 3
ModemImageVer : 2.3.1
BootloaderVer : 20180130_cisco
ModemAgentVer : 1.02
SerialNumber : FOC23126GDH
PID : IXM-LPWA-800-16-K9
UTCTime : 19:04:09.033 UTC Thu Mar 04 2022
IPv4Address : 192.168.100.2
IPv6Address : none
FPGAVersion : 61
TimeZone : PST
LocalTime : Thu Mar 4 11:04:09 PST 2022
ACT2 Authentication : PASS
ModemVersionID : V01
ProtocolVersion : 2
ChipID : LSB = 0x306b0a14 MSB = 0x00f14200
LoRaSerialNumber : FOC22433QLK
LoRaCalc :
<135,122,114,106,98,94,90,86,77,69,60,52,43,39,35,31-142,130,122,114,106,102,98,94,85,77,69,60,52,48,44,40>
CalTempCelsius : 40
CalTempCodeAD9361 : 97
RSSIOffset : -202.16,-202.99
AESKey : Unknown
```

**Step 4** Upgrade the firmware to Release 2.3.1 using the following factory install CLI:

```
IR829_1#virtual-lpwa 10 modem install firmware factory flash:ixm_mdm_i_k9-2.3.1.tar.gz
```

**Step 5** After the image is installed successfully, verify the status. As shown in the following output, **ModemImageVer** has been updated, but **BootloaderVer** remains the same.

**Example:**

```
IR829_1#show virtual-lpwa 3 modem infoName : Virtual-LPWA 3
ModemImageVer : 2.3.1
BootloaderVer : 20180130_cisco
ModemAgentVer : 1.02
SerialNumber : FOC23126GDH
PID : IXM-LPWA-800-16-K9
UTCTime : 19:04:09.033 UTC Thu Mar 04 2021
IPv4Address : 192.168.100.2
IPv6Address : none
FPGAVersion : 61
TimeZone : PST
LocalTime : Thu Mar 4 11:04:09 PST 2021
ACT2 Authentication : PASS
ModemVersionID : V01
ProtocolVersion : 2
ChipID : LSB = 0x306b0a14 MSB = 0x00f14200
LoRaSerialNumber : FOC22433QLK
LoRaCalc :
```

```
<135,122,114,106,98,94,90,86,77,69,60,52,43,39,35,31-142,130,122,114,106,102,98,94,85,77,69,60,52,48,44,40>
CalTempCelsius : 40
CalTempCodeAD9361 : 97
RSSIOffset : -202.16,-202.99
AESKey : Unknown
```

**Step 6** Upgrade the firmware to Release 2.3.1 using the same CLI with uboot or uboot-only option:

```
IR829_1#virtual-lpwa 10 modem install firmware factory flash:ixm_mdm_i_k9-2.3.1.tar.gz ?
no-uboot      install without uboot
only-uboot    install uboot only
uboot         install uboot together
<cr>
```

**Note** This step is to upgrade the uboot options if the device is upgraded to Release 2.3.1 for the first time, because the uboot options are not available for Release 1.0.20. Additionally, to use these uboot options in IR8x9, you must upgrade the IOS image of IR8x9 to Release 15.7(3)M2.

**Note** If certificates for IPSec have been persistently stored in the module in any image before 2.0, follow this procedure during an upgrade to image 2.0 and later. This applies to both factory and normal upgrades and must be done for proper behavior of the module.

- a. Erase the certificates.
- b. Upgrade the image.
- c. Re-download the new certificates.

**Step 7** After the image is installed successfully, verify the status. You will find from the output that both **ModemImageVer** and **BootloaderVer** have been upgraded.

**Example:**

```
IR829#show virtual-lpwa 3 modem info
Name : Virtual-LPWA 3
ModemImageVer : 2.3.1
BootloaderVer : 20180130_cisco
ModemAgentVer : 1.02
SerialNumber : FOC23126GDH
PID : IXM-LPWA-800-16-K9
UTCTime : 19:04:09.033 UTC Thu Mar 04 2022
IPv4Address : 192.168.100.2
IPv6Address : none
FPGAVersion : 61
TimeZone : PST
LocalTime : Thu Mar 4 11:04:09 PST 2022
ACT2 Authentication : PASS
ModemVersionID : V01
ProtocolVersion : 2
ChipID : LSB = 0x306b0a14 MSB = 0x00f14200
LoRaSerialNumber : FOC22433QLK
LoRaCalc :
<135,122,114,106,98,94,90,86,77,69,60,52,43,39,35,31-142,130,122,114,106,102,98,94,85,77,69,60,52,48,44,40>
CalTempCelsius : 40
CalTempCodeAD9361 : 97
RSSIOffset : -202.16,-202.99
AESKey : Unknown
```



## Switching Between Standalone Mode and Virtual Mode

When the LoRaWAN gateway is in standalone mode, use the **switchover** EXEC command to switch to the virtual mode.

```
#switchover
```

You can switch the LoRaWAN gateway from virtual mode to standalone mode through IR8x9, using the following command.

```
IR800#virtual-lpwa 1 modem standalone mode enable
```

## New Features In This Release

The following new features are introduced in this release:

- IPsec tunnel traffic flow enhancements
- CPF connection enhancements

## New Commands In This Release

This section contains new commands in this release.

### Standalone Mode Commands

The following table provides the new standalone mode command in this release.

Command	Purpose
<code>ipsec retry <i>retry-count</i> delay <i>delay-time</i></code>	Configure number of IPsec retries and delay time (minutes) before IPsec restarts when IPsec is down: <ul style="list-style-type: none"> <li>• <i>retry-count</i>—Number of IPsec retries when IPsec is down.</li> <li>• <i>delay-time</i>—Minutes of delay before restarting IPsec.</li> </ul> Executed from global configuration prompt.

### Common-Packet-Forwarder (CPF) Commands

The following table provides the Common-Packet-Forwarder (CPF) profile configuration commands.

1. Type “configure terminal” at the exec prompt.
2. Type “common-packet-forwarder profile” at the global configuration prompt.

Command	Purpose
<code>tcp-user-timeout timeout</code>	Configure TCP user timeout option: <ul style="list-style-type: none"> <li><code>timeout</code>—TCP timeout in seconds.</li> </ul>

## Caveats

You can use the Bug Search Tool to find information about caveats, including a description of the problems and available workarounds. The Bug Search Tool lists both open and resolved caveats.

To use the Bug Search Tool:

1. Go to <https://tools.cisco.com/bugsearch/>.
2. Log in with your Cisco.com user ID and password.
3. Enter information in the Search For, Product, and Releases field as needed, then press **Enter**.

For more information about the Bug Search Tool, click **Help** on the main Bug Search Tool page.

## Resolved Caveats

This section contains resolved caveats for this release.

**Table 1: Resolved Caveats**

Caveat ID Number	Description
<a href="#">CSCwb04080</a>	Add CLI to set IPSEC retry count and delay time when ipsec tunnel is down.
<a href="#">CSCwb05380</a>	Connection between CPF (on IXM) and Network Server periodically drops for about 15 minutes.
<a href="#">CSCwb73466</a>	Invalid port range for secure reverse SSH tunnel config.
<a href="#">CSCwb73483</a>	Typo error in privilege exec command to switch IXM from Standalone to Virtual mode.

## Related Documentation

These documents provide detailed information about the Cisco LoRaWAN Gateway and are available at: [www.cisco.com/go/lorawanmodule](http://www.cisco.com/go/lorawanmodule)

- [Getting Started and Product Document of Compliance for the Cisco LoRaWAN Interface Module](#)
- [Cisco LoRaWAN Gateway Hardware Installation Guide](#)
- [Cisco LoRaWAN Gateway Software Configuration Guide](#)

- [Release Notes for IoT Field Network Director](#)
- [Release Notes for Cisco IR800 Industrial Integrated Services Routers and Cisco 1000 Series Connected Grid Routers](#)
- [Cisco IR800 Integrated Services Router Software Configuration Guide](#)
- [Cisco IoT Field Network Director User Guide](#)

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