

Release Notes for the Cisco LoRaWAN Gateway, Release 2.0.20

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Release Notes for the Cisco LoRaWAN Gateway, Release 2.0.20

These release notes include important information about Cisco LoRaWAN Gateway Software Release 2.0.20 and the limitations, restrictions, and caveats, if any, that apply to this release.



Note The documentation set for this product strives to use bias-free language. For purposes of this documentation set, bias-free is defined as language that does not imply discrimination based on age, disability, gender, racial identity, ethnic identity, sexual orientation, socioeconomic status, and intersectionality. Exceptions may be present in the documentation due to language that is hardcoded in the user interfaces of the product software, language used based on RFP documentation, or language that is used by a referenced third-party product.

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.



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

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](#).

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	LoRa Forwarder Package (LRR) Version
ixm_mdm_i_k9-2.0.20.tar.gz	Cisco LoRaWAN Gateway OS Image Version 2.0.20 with Semtech Release Version 2.3.0, FPGA Version 61, and HAL Version 5.1.0	LRR 2.2.62 Note The LoRa Forwarder Package is provided by Activity Thingpark. For other third party Network Server, it is vendor dependent.



Note The LRR version has dependencies with the IXM LoRaWAN firmware/FPGA/HAL release. Contact your Cisco representative if you are using different versions.

Installation of a New Software Release

For both standalone mode and virtual mode, after you upgrade the LoRaWAN gateway to Release 2.0.20 or higher version, you will not be able to downgrade to any version older than Release 2.0.20 (for example, Release 2.0, or Release 2.0.11).

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.

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#show virtual-lpwa 1 modem info
Name : Virtual-LPWA 1
ModemImageVer : 2.0.x
BootloaderVer : 20160830_cisco
ModemAgentVer : 1.02
SerialNumber : FOC21028RBH
PID : IXM-LPWA-900-16-K9
UTCTime : 19:14:14.465 UTC Tue Aug 29 2017
IPv4Address : 192.168.1.2
IPv6Address : none
FPGAVersion : 58
TimeZone : UTC
LocalTime : Tue Aug 29 19:14:14 UTC 2017
ACT2 Authentication : PASS
ModemVersionID : V01
ProtocolVersion : 2
ChipID : LSB = 0x28750305 MSB = 0x00f1400e
LoRaSerialNumber : FOC21028R05
LoRaCalc :
<NA,NA,NA,55,37,110,101,93,84,76,68,58,49,39,30,21-NA,NA,NA,50,31,106,97,88
,80,71,63,53,44,34,25,16>
CalTempCelsius : 35
CalTempCodeAD9361 : 92
RSSIOffset : -204.00,-204.00
-203.00,-203.00
AESKey : Unknown
```

Follow this procedure to upgrade to Release 2.0.x:

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#copy ftp://root:cisco@192.168.0.1/temp/ixm_mdm_i_k9-2.0.x.tar.gz flash:
Destination filename [ixm_mdm_i_k9-2.0.x.tar.gz]?
Accessing ftp://*:*@192.168.0.1/temp/ixm_mdm_i_k9-2.0.x.tar.gz...
Loading temp/ixm_mdm_i_k9-2.0.x.tar.gz
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
[OK - 70138462/4096 bytes]

70138462 bytes copied in 247.056 secs (283897 bytes/sec)
```

```
IR829#dir | include ixm
68 -rw- 70138462 Jun 2 2017 17:56:22 +00:00 ixm_mdm_i_k9-2.0.x.tar.gz
```

- 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 58. 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#show virtual-lpwa 1 modem status
```

```
Name : Virtual-LPWA 1
Status : Running
Uptime : 0:05:02.130000
Door : DoorClose
```

Upgrade Status : Ready

```
IR829#show virtual-lpwa 1 modem info
```

```
Name : Virtual-LPWA 1
ModemImageVer : 1.0.20
BootloaderVer : 20160830_cisco
ModemAgentVer : 1.02
SerialNumber : FOC20304ZG8
PID : IXM-LPWA-800-16-K9
UTCtime : 17:30:45.593 UTC Fri Jun 02 2017
IPv4Address : 10.16.16.5
IPv6Address : none
FPGAVersion : 58
TimeZone : CEST
LocalTime : Fri Jun 2 19:30:45 CEST 2017
ACT2 Authentication : PASS
ModemVersionID : V01
ProtocolVersion : 2
ChipID : LSB = 0x28610316 MSB = 0x00f14086
LoRaSerialNumber : FOC203310FV
LoRaCalc : <153,140,132,124,116,112,108,104,95,87,78,70,61,57,53,49-156,
144,136,128,120,116,112,108,99,91,83,74,66,62,58,54>
CalTempCelsius : 41
CalTempCodeAD9361 : 98
RSSIOffset : -204.35,-205.89

AESKey : 595EB592055421C06895E4D4CE0FE63D
```

- Step 4** Upgrade the firmware to Release 2.0.x using the following factory install CLI:

```
IR829#virtual-lpwa 1 modem install firmware factory flash:ixm_mdm_i_k9-2.0.x.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#show virtual-lpwa 1 modem info
```

```
Name : Virtual-LPWA 1
ModemImageVer : 2.0.x
BootloaderVer : 20160830_cisco
ModemAgentVer : 1.02
SerialNumber : FOC20304ZG8
PID : IXM-LPWA-800-16-K9
```

```

UTCTime : 18:12:50.141 UTC Fri Jun 02 2017
IPv4Address : 10.16.16.5
IPv6Address : none
FPGAVersion : 58
TimeZone : CEST
LocalTime : Fri Jun  2 20:12:50 CEST 2017
ACT2 Authentication : PASS
ModemVersionID : V01
ProtocolVersion : 2
ChipID : LSB = 0x28610316 MSB = 0x00f14086
LoRaSerialNumber : FOC203310FV
LoRaCalc :
<153,140,132,124,116,112,108,104,95,87,78,70,61,57,53,49-156,144,136,128,120,116,112,108,99,91,83,74,66,62,58,54>
CalTempCelsius : 41
CalTempCodeAD9361 : 98
RSSIOffset : -204.35,-205.89

AESKey : D6E59138224920AA66D99F680CFD9543

IR829#

```

Step 6 Upgrade the firmware to Release 2.0.x using the same CLI with uboot or uboot-only option:

```

IR829#virtual-lpwa 1 modem install firmware factory flash:ixm_mdm_i_k9-2.0.x.K1.tar.gz ?
  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 2.0.x 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)M or later (such as **ir800-universalk9-bundle.SPA.157-3.M.bin**).

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 1 modem info
Name :Virtual-LPWA 1
ModemImageVer : 2.0.x
BootloaderVer: 20170515_cisco
.....

```

Firmware Upgrade From Standalone Mode



Note We assume that you have the latest FPGA v58. If you have loaded any recent release like 2.0.10 or 2.0.11 on the IXM, use the **show inventory** command to check the FPGA status. If the FPGA version is not 58, upgrade first with an image that has FPGA v58.

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 115.2kbs.

Step 2 Check the current version before upgrade.

Example:

```
IXM1#show version
Corsica Software, Version 2.0.11, RELEASE SOFTWARE
Technical Support: http://www.cisco.com/techsupport
Copyright (c) 2012-2014, 2017 by Cisco Systems, Inc.
Compiled 18-Sep-2017.16:19:04UTC-07:00 by Corsica Team
```

```
ROM: Bootstrap program is Corsica boot loader
Firmware Version : 2.0.11, RELEASE SOFTWARE
Bootloader Version: 20170515_cisco
```

```
Hostname:ipsectesting uptime is 21 hours, 45 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 1027308K bytes of memory.
Last reset from power-on
```

```
Base ethernet MAC Address : 00:50:43:00:02:01
Model revision number: : C0
System serial number: : FOC21028RFP
```


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

Example:

```
IXM1#show version
Corsica Software, Version 2.0.19.rc11, RELEASE SOFTWARE
Technical Support: http://www.cisco.com/techsupport
Copyright (c) 2012-2014, 2017 by Cisco Systems, Inc.
Compiled 12-Dec-2017.14:00:57UTC-08:00 by Corsica Team
```

```
ROM: Bootstrap program is Corsica boot loader
Firmware Version : 2.0.19.rc11, RELEASE SOFTWARE
Bootloader Version: 20170515_cisco
```

```
Hostname:Gateway uptime is 6 minutes
Using secondary system image
```

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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 1028460K bytes of memory.
Last reset from power-on
```

```
Base ethernet MAC Address : 00:50:43:00:02:01
Model revision number: : C0
System serial number: : FOC21028RFP
```

Step 5 Check the FPGA status using the following command:

Example:

```
Gateway#show inventory
Name : Gateway
ImageVer : 2.0.19.rc11
BootloaderVer : 20170515_cisco
SerialNumber : FOC21028RFP
PID : IXM-LPWA-900-16-K9
UTCtime : 00:05:54.769 UTC Sat Aug 06 2016
FPGAVersion : Upgrading
FPGAStatus : Upgrading: 22.5%
ChipID : Not available while fpga is upgrading...
TimeZone : UTC
LocalTime : Sat Aug 6 00:05:54 UTC 2016
ACT2 Authentication: PASS
```


Wait until the FPGA is upgraded and shown as 61.

```
IXM1#show inventory
Name : Gateway
ImageVer : 2.0.19.rc11
BootloaderVer : 20170515_cisco
SerialNumber : FOC21028RFP
PID : IXM-LPWA-900-16-K9
UTCTime : 00:17:00.902 UTC Sat Aug 06 2016
FPGAVersion : 61
FPGAStatus : Ready
ChipID : Not available. Please turn on radio
TimeZone : UTC
LocalTime : Sat Aug 6 00:17:00 UTC 2016
ACT2 Authentication: PASS
```

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 and Changed Information

This section contains new and changed information for this release.

New Software Features in Release 2.0.20

Release 2.0.20 introduces the following new software features:

- Support of FPGA Version 61 and HAL 5.1.0 based on Semtech 2.3.0 SDK for Cisco LoRaWAN gateway.
- Support SHA512 password encryption.
- Support to use dual ISR4221 with software version 16.5.1b or later as HERs.
- Support Active/Backup VPN tunnels between two HERs.
- Support CSR1000V with software version of CSR1000v-universalk9.16.03.05 or later as the CA server for IXM to enroll RSA certificate from ISR4221.
- Removed the limitation of reboot on LXC or IXM when SSH parameters change.
- Support to disable SSH access from core network to LAN IP address.

- Support to not store IPsec secrets in the file system.
- Support unprivileged LXC.
- Restrict access to a root shell inside LXC. The system password is needed to get into LXC from Host.
- Support to mount tmpfs and removable media with appropriate access rights.
- Removed tcpdump, telnet, and telnetd from the firmware.
- Added security options in kernel configuration.
- Support to display the total number of satellites used in standalone mode only.
- Support to show IPsec log.

New and Changed Commands

This section contains new and changed commands for this release. For more information, see the [Cisco LoRaWAN Gateway Software Configuration Guide](#) and the "Configuring Virtual-LPWA" chapter of the [Cisco IR800 Integrated Services Router Software Configuration Guide](#).

- The following commands are changed in this release for the standalone mode:
 - The **ipsec cert install local enable** command has replaced the **ipsec cert install usb enable** command, to support both flash and usb.
 - The **ipsec install local** command has replaced the **ipsec install usb** command.
- The following commands are added in this release for the standalone mode:
 - **ip ssh limit-local** - Disable SSH on LAN interface or fastethernet 0/1.
 - Behavior change of the **request shell container** command - Need password. If you have changed the system admin password, you need to use the new password.



Note Admin can change the password by using the **sysadmin security password** command.

- **ipsec lxc-restart-disable** - Disable lxc restart whenever tunnel goes up or down.
- **ipsec subnet lock** - Allow only subnet related traffic.
- **ipsec cert scep** - Add support for xpki.

Example

```
Gateway(config)#ipsec cert scep http://172.27.163.69/cgi-bin/pkiclient.exe US CA
Milpitas Cisco iot CSR1K true
```

xpki - Use a Cisco Router as the CA server
 ndes - Use a Window server as the CA server

- The following command is updated in this release for the virtual mode:

- IPsec RSA between IXM and IR809. Added a new option "profile" to the **lpwa modem scep** command.

```
IR800(config-if)#lpwa modem scep ?
flash:  Location of scep parameter file
nvram:  Location of scep parameter file
profile  Configure scep parameters          <<< new profile option
```

The following is an example of configuring **lpwa modem scep profile**:

Example

```
interface Virtual-LPWA3
no ip address
ip nat inside
ip virtual-reassembly in
lpwa packet-forwarder public-key flash:lrr-opk.pubkey
lpwa packet-forwarder firmware flash:lrr-2.2.60-ciscoms-noconfig.cpkg auto-install
unconditional
lpwa modem password root $1$045802150C2E
lpwa modem ntp server address 172.27.74.9
lpwa modem timezone America/Los_Angeles
lpwa modem ipsec enable
lpwa modem isakmp cisco cisco 192.168.111.1 group strongswan cisco123 72000
lpwa modem scep profile
  country US
  province CA
  locality Milpitas
  organization Cisco
  unit iot
  name LORA
  persistent true
  url http://172.27.126.60/CertSrv/mscep/mscep.dll
  lpwa modem gps ubx
end
```

Caveats

This section contains the caveats for this release.

- **CSCvi92370**

Symptom: Upgrading IXM image via USB and having the USB connected to the unit while upgrading can cause problem and block the upgrade.

Workaround: Copy the IXM image to flash and perform archive download via FLASH. Unplug USB while the boot is happening. If the IXM is in error state, simply unplug the USB. The device will recover from the error state after several minutes.

- **CSCvi70922**

Symptom: The **virtual-lpwa packet forwarder install/uninstall** exec commands have no effect.

Workaround: In IOS, the packet forwarder installation exec commands are not supported and have been removed.

- **CSCvh06187**

Symptom: In virtual mode, the XPKI CA server is not supported when SCEP is configured from file instead of profile.

Workaround: Configure the XPKI CA server using the **lpwa modem scep profile** command, and make sure that every parameter is configured properly.

- **CSCvh00511**

Symptom: FTP server does not accept passwords with special characters like ! or #.

Workaround: Avoid using these special characters.

Resolved Caveats in Release 2.0.20

- **CSCvf98764**

Symptom: SSH parameters are not honored.

Workaround: There is no workaround.

- **CSCvg00838**

Symptom: When backup goes down, the primary tunnel is resetting in certain cases.

Workaround: There is no workaround.

Known Issues

- **CSCvh04512**

Symptom: In virtual mode, when SCEP are configured with parameters in profile, "lpwa modem scep profile" is missing when not all of the parameters are configured.

Workaround: Configure all SCEP profile parameters one by one, and finally "lpwa modem scep profile" will appear. It will take effect when the last parameter is configured.

- **CSCvh06187**

Symptom: In virtual mode, the XPKI CA server is not supported when SCEP is configured from file instead of profile.

Workaround: Configure the XPKI CA server using the **lpwa modem scep profile** command, and make sure that every parameter is configured properly.

- **CSCvg67608**

Symptom: SHA 512 and MD5 passwords mapping is not happening. While upgrading to 2.0.20, admin has to reconfigure the passwords for SHA512 to be effective and downgrade is not supported.

Workaround: Reconfigure the passwords for SHA512 as admin after upgrading to 2.0.20.

- **CSCvh00511**

Symptom: FTP server does not accept passwords with special characters like ! or #.

Workaround: Avoid using these special characters.

- GPS synchronization issue while UBX is on.

Symptom: There is issue with UBX interoperating with LRR.

Workaround: You are recommended to turn off UBX while LRR is running. Currently, there is no effect on other functions with UBX off.

Related Documentation

These documents provide detailed information about the Cisco LoRaWAN Gateway and are available at: 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](#)

Obtaining Documentation and Submitting a Service Request

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