Cisco IOS Release 15.6(3)M - Release Notes for Cisco IR800 Industrial Integrated Services Routers and Cisco 1000 Series Connected Grid Routers

The following release notes support Cisco IOS Releases 15.6(3)M and higher releases. These release notes are updated to describe new features, limitations, troubleshooting, recommended configurations, caveats, and how to obtain support and documentation.

Updated: March 16, 2022

Contents

This publication consists of the following sections:

Image Information and Supported Platforms

Note You must have a Cisco.com account to download the software.

Cisco IOS Release 15.6(3)M includes the following Cisco IOS images:

- ir800-universalk9-bundle.SSA.156-3.M.bin

  This bundle contains the following components:

  - Hypervisor: 2.55
  - Guest Operating System: Cisco-GOS,version-1.1.0.4
  - IOS: final version 15.6(3)M

- cgr1000-universalk9-bundle.SSA.156-3.M

  - Hypervisor: 1.8.6
  - Guest Operating System: Cisco-GOS,version-1.35
  - IOS: final version 15.6(3)M

The latest image file for the IR809 and IR829 can be found at:

https://software.cisco.com/download/navigator.html?mdfid=286287045&flowid=75322

The latest image file for the CGR 1000 Series Cisco IOS image is:

https://software.cisco.com/download/navigator.html?mdfid=284165761&flowid=75122

Note The ir800-universalk9-bundle.SPA.156-3.M.bin bundle must be copied via Trivial File Transfer Protocol (TFTP) to the IR800, and then installed using the `bundle install flash:<image name>` command. The ir800-universalk9-bundle.SPA.156-3.M.bin file can NOT be directly booted using the `boot system flash:/image_name`. Detailed instructions are found in the Cisco IR829 and IR809 Integrated Services Router Hardware Installation Guides.

Note The cipher **dhe-aes-256-cbc-sha** (which is used with the commands **ip http client secure-ciphersuite** and **ip http secure-ciphersuite**) is no longer available in IOS 15.6(3)M and later as part of the weak cipher removal process. This cipher was flagged as a security vulnerability.

For details on the CGR1000 installation, please see:

http://www.cisco.com/c/en/us/td/docs/routers/connectedgrid/cgr1000/ios/release/notes/OL-31148-05.html#pgfId-998856

Major Enhancements

This release includes the following enhancements to the IR800 series:

- Boot Time Reduction
- Copper SFP Support
- USB Support

- Serial Device Configuration
- Memory Allocation Optimization
- Digital Alarm Support for CGR 1000 Series routers
- Enhancements to Mesh Security
- Compute Module for CGR 1000 Series routers
- Support for the Cisco LoRaWAN Interface

Boot Time Reduction

Enhancements were made to optimize the amount of time it takes to go from power up to fully functional.

Copper SFP Support

Support for the following copper SFPs has been added:

- GLC- T: (0 to 70°C) — Cisco Part Number is 30-1410-04
- SFP-GE-T: (-5 to 85°C) — Cisco Part Number is 30-1421-02

Additional details can be found in the respective Hardware Installation Guides at:

Cisco 800 Series Industrial Integrated Services Routers

USB Support

Previous to 15.6(3)M, the USB devices, which are connected to external USB port could be emulated on the Guest OS through OHCI mode only. With this feature Hypervisor will be enhanced to support EHCI emulation to Guest OS.

Serial Device Configuration

Previously, the Guest OS could not configure the physical serial port on the device. The serial port configuration (e.g. baud rate change) of the serial port needed to be done in IOS.

With 15.6(3)M, Hypervisor and IOS are enhanced so that if the Guest OS changes the virtual serial port configuration, it notifies IOS, and IOS applies the configuration to the physical serial port.

Command line changes consist of the following:

A new option is appended to allow the baudrate, databits, stopbits and parity propagation from Guest OS. If "propagation" is present, the control parameters will be passed from Guest OS to IOS physical port. Otherwise it functions as before.

The serial port control parameters included in the propagation are: baudrate, databits, stopbits and parity.

```
relay line <linex> <liney> [propagation]
```

Memory Allocation Optimization

Improvements have been made in the memory allocation optimization between VDS, IOS and GOS on the IR800. Previously, the 2GB RAM was allocated as follows:

- VDS: 512MB

- IOS: 512MB

- Guest OS: 725MB

- Remainder: used by Hypervisor (e.g. device share memory)

Now with optimization, the VDS memory was reduced to give at least 1GB to the Guest OS.

Digital Alarm Support for CGR 1000 Series routers

The routers now support the following Digital Input and Output command-line interface (CLI) commands:

CGR 1240:

Alarm port contact (Input Alarms):

```
 [no] alarm contact {1|2} {description <name> | severity {critical | major | minor | none}
| trigger {closed | open}}
 [no] alarm contact all {severity {critical | major | minor | none} | trigger {closed |
open}}
```

Alarm port relay (Output Alarms):

```
[no] alarm relay {1|2} {door | temperature [ major | minor ] | input-alarm {1|2}}
```

CGR 1120:

Alarm port contact (Input Alarms):

```
 [no] alarm contact {1|2|3|4} {description <name> | severity {critical | major | minor |
none} | trigger {closed | open}}
 [no] alarm contact all {severity {critical | major | minor | none} | trigger {closed |
open}}
```

Alarm port relay (Output Alarms):

```
[no] alarm relay {1} {temperature [ major | minor ] | input-alarm {1|2|3|4}}
```

You can find new commands in the CGR 1000 Series Hardware Installation Guides at:

http://www.cisco.com/c/en/us/products/routers/1000-series-connected-grid-routers/index.html

Enhancements to Mesh Security

To better fine tune mesh networks some hard coded parameters have been made configurable. Four CLI commands have been added to configure key exchange timeout, key exchange retries, max key exchange failure, and key exchange permanent timeout. Another four CLI commands are added to show the values of these parameters. These commands are as follows:

Configuration CLI Commands

`[no] mesh-security key-exchange-message-timeout` *<value>*
This command is used to configure the mesh security key exchange timeout. The default value is 10 seconds. The range is from 1 second to 30 minutes.

`[no] mesh-security key-exchange-message-retries` *<value>*
This command is used to configure the mesh security key exchange retries. The default value is 5. The range is from 1 to 50.

`[no] mesh-security key-exchange-message-failures` *<value>*
This command is used to configure the key exchange failures. The default value is 5. The range is from 1 to 50.

`[no] mesh-security key-exchange-permanent-timeout` *<value>*
This command is used to configure the mesh security key exchange permanent timeout. The default value is 3600 seconds. The range is from 60 second to 6 hours.

Show CLI Commands

`show mesh-security key-exchange-message-timeout`
This command is used to show the value of mesh security key exchange timeout.

`show mesh-security key-exchange-message-retries`
This command is used to show the value of mesh security key exchange retries.

`show mesh-security key-exchange-message-failures`
This command is used to show the value of mesh security key exchange failures.

`show mesh-security key-exchange-message-permanent-timeout`
This command is used to show the value of mesh security key exchange permanent timeout.

Compute Module for CGR 1000 Series routers

The Connected Grid Router (CGR) Compute module is a modular, hardened server that can be inserted into CGR 1000 routers. The Compute module functions as a fog computing node at the edge of the network.

The Compute module runs Cisco IOx, a Hypervisor architecture, in which Cisco IOS software runs as a Virtual Machine (VM) alongside a Windows VM. Customers can run Internet of Things (IoT) applications on the Linux VM and can also connect legacy networking technologies through a network interface card. For example, applications hosted on the router can collect system information by sniffing and processing packets or by querying network information from IOS using APIs. By acquiring this information, the applications can use it to control and query other network devices using IoT protocols.

Compute Module SKUs:

Product ID	Bulk Memory	DDR Memory	CPU
CGM-SRV-64	50 GB	4 GB	AMD GX-410VC. 4-Core 800Mhz
CGM-SRV-128	100GB	4 GB	AMD GX-410VC. 4-Core 800Mhz

For more information please see the Cisco IOx page:

http://www.cisco.com/c/en/us/products/cloud-systems-management/iox/index.html

Support for the Cisco LoRaWAN Interface

The Cisco Interface Module for LoRaWAN extends connectivity of IoT routers to include low-power wide-area (LPWA) access. 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   You need to install he Actility Thingpark LRR software for the Cisco LoRaWAN Interface Module to work.

For more information about the Cisco Interface Module for LoRaWAN, see the following resources:

Cisco Interface Module for LoRaWAN

Related Documentation

The following documentation is available:

- Cisco IOS 15.6(3)M cross-platform release notes:

  http://www.cisco.com/c/en/us/td/docs/ios/15_6m_and_t/release/notes/15_6m_and_t.html

- All of the Cisco IR800 Industrial Integrated Services Router documentation can be found here:

  http://www.cisco.com/c/en/us/support/routers/800-series-industrial-routers/tsd-products-support-series-home.html

- All of the Cisco CGR 1000 Series Connected Grid Routers documentation can be found here:

  http://www.cisco.com/c/en/us/support/routers/1000-series-connected-grid-routers/tsd-products-support-series-home.html

Known Limitations

This release has the following limitations or deviations for expected behavior:

- The IR800 series is feature equivalent to the to C8xx series, however, support for this initial release has not implemented or validated for all features.

  For example:

  C8xx supports the following features under Ge0:

```
c819(config)#int gigabitEthernet 0
c819(config-if)#ethernet ?
  cfm       Ethernet CFM interface commands
  dot1ad    dot1ad port
  lmi       Ethernet LMI interface commands
  loopback  Ethernet Dataplane Loopback
  oam       Operations, Administration and Maintenance
  uni       Configure Ether UNI
  vlan      Configure Ethernet vlan
```

IR8xx supports the following:

```
IR800_2(config)#int gigabitEthernet 0
IR800_2(config-if)#ethernet ?
  cfm  Ethernet CFM interface commands
  lmi  Ethernet LMI interface commands
```

- Show led command has a lag from the actual LEDs at first, then it stabilizes.
- Changing the default Guest OS CPU allocation may after the router performance. Detailed instructions are found in the Cisco IR829 Integrated Services Router Hardware Installation Guide and the Cisco IR809 Integrated Services Router Hardware Installation Guide.

All of the Cisco IR800 Industrial Integrated Services Router documentation can be found here:

http://www.cisco.com/c/en/us/support/routers/800-series-industrial-routers/tsd-products-support-series-home.html

Caveat CSCvf76265 crosses over several different IOS software releases, and is a platform driver code issue. It is included here as a known limitation with the IR800 and CGR Industrial Routers.

On both the CGR1000 and IR800, the core dump fails to write into the local flash. The IOS is running as a virtual machine and then hypervisor is running underneath. The local flash is provided by the hypervisor as a virtual disk. When a crash occurs, this virtual disk is no longer available therefore copying to flash will fail. The workaround is to use an ftp server to copy the core dump to.

Caveats

Caveats describe unexpected behavior in Cisco IOS releases. Caveats listed as open in a prior release are carried forward to the next release as either open or closed (resolved).

Note   You must have a Cisco.com account to log in and access the Cisco Bug Search Tool. If you do not have one, you can register for an account.

For more information about the Cisco Bug Search Tool, see the Bug Search Tool Help & FAQ.

Cisco IOS Release 15.6(3)M

The following sections list caveats for Cisco IOS Release 15.6(3)M:

Open Caveats

- **CSCva66036**

  After upgrading the modem on a CGR1240, the modem needed to be power-cycled in order to bring it up.

  Workaround:

  None

- **CSCva32006**

  When executing a series of show and configuration commands quickly on an ISR-G2, via an SSH session, an SSH Process Thrash message is generated.

Workaround:

When executing multiple commands, wait a few seconds between each command.

- **CSCuu49331**

   LED status report for PoE is inconsistent across different commands.

   Workaround:

   None

- **CSCuy79750**

   After completion of a bundle installation, the Guest OS might not function.

   Conditions:

   Perform a bundle installation with the Guest OS running. After the bundle installation is completed with Guest OS updated, the device needs to be reloaded.

   Workaround:

   It is recommended to shutdown the Guest OS before performing a bundle install. After the bundle installation is completed, the device needs to be reloaded.

- **CSCut75469**

   IR829 is not getting GPS data after router bootup

   Conditions:

   After router bootup, sometimes the modem is up but does not get GPS data.

   Workaround:

   Power cycle the modem.

- **CSCuz40849**

   Cisco IOS cannot decode certificate lifetime past the year 2099

   Conditions:

   The validity end-time for either CA certificate or certificates must be 2099 or earlier. Cisco IOS cannot decode dates past 2099. BER/DER decoding failure will be generated during authentication and enrollment phases.

   Workaround:

   None

- **CSCuz51085**

   Registration on the CGR1K, IR800, and C819 will always fails after a flash format or folder deletion.

   Conditions:

   Once a device has been tunnel-provisioned (including those that have been registered to FND), any attempt to format its flash partition or delete the managed folder on the flash will cause any future registration (e.g. after a router reload, or a fresh ZTD operation) to fail.

   Sample Registration Failure:

   java.io.IOException: Failed to retrieve inventory from device. Reason: [invalid cli command] Sent [[show iox host list detail | format flash:/managed/odm/cg-nms.odm, show iox application list | format flash:/managed/odm/cg-nms.odm]]

   Workaround:

Access the FND's Oracle database and delete the MD5 checksum of the updated odm file for these eid's from the database.

- **CSCuz66824**

The alarm contact configuration command syntax changed in 15.6(3)M.

Conditions:

In the 15.6(3)M or later releases, there is a slight change in the command syntax for the alarm contact configuration. If alarm contact is configured in IOS images prior to 15.6(3)M, and the device is upgraded to15.6(3)M, the alarm contact will need to be reconfigured using the new command syntax. Otherwise, the alarm contact setting will be lost.

Command Syntax Difference:

Pre-15.6(3)M with hyphen between alarm and contact:

```
hostname(config)#alarm-contact ?
  <1-2>  Alarm contact number
  all    Configure all alarm contacts
```

Post-15.6(3)M with no hyphen between alarm and contact:

```
hostname(config)#alarm contact ?
  <1-2>  Alarm contact number
  all    Configure all alarm contacts
```

Workaround:

Reconfigure the alarm contact after upgrading to 15.6(3)M.

- **CSCuu49331**

LED status report is inconsistent across different commands

Conditions: PoE LED will go back and forth between yellow and green when there is a PoE device in deny power state. Typing `show platform led` or `show platform led summary` will sometimes show yellow, sometimes shows green.

Workaround: Remove the device that has been denied for power allocation

- **CSCuu60617**

Media-type rs485 is configurable under IR800 serial port 0 interface (async1), however the serial port 1 (async1) interface does not support media-type rs485.

Conditions: When you configure 'media-type rs485" under the async1 interface, the configuration is acceptable.

Workaround: None

- **CSCux43383**

On the IR829 with a 4GModem, the modem can enter into an unknown state after several modem resets.

Conditions: After 100+ modem resets and attach to BSS, the modem enters into a state where it no longer displays modem info on IOS (`show cellular 0 all`). It neither attaches to the BSS or sends IP traffic. Modem seems to respond to the AT commands.

Workaround: None

- **CSCuy83574**

Enabling GPS on the CGR1000 3G/4G cellular controller will lock up the console.

Conditions: The regular GPS settings for 3G or 4G cellular controller in the CGR1000 routers must not be used. Cellular modem-based GPS in CGR1000 routers is not supported.

Workaround: Only a CONFIG RESET button recovery may help to restore the CGR1000 back to working condition.

- **CSCuy91636**

  CGR1000 GOS image version is not matching the version in the filename.

  Conditions: The version in the CGR1000 GOS file name "`cgr1000-ref-gos.img.1.30.gz`" is 1.30, but after a bundle install and restarting the IOX VM, the GOS version being retrieved from "`sh platform guest-os`" is 1.29.

  Workaround: None

- **CSCuy91651**

  Inconsistent version numbering for the Ref-GOS image name in the IR800 bundle image.

  Conditions: In the IR800 bundle image, the REF GOS image name is: `ir800-ref-gos.img.2.3.gz`.

  Installing the GOS image will produce this version string:

  ```
  Installation: Cisco-GOS,version-1.0.0.2
  ```

  Guest OS status:

  ```
  Installation: Cisco-GOS,version-1.0.0.2
  ```

  The IR800 GOS image is properly versioned in the form: `ir800-ioxvm-1.0.0.x`

  Workaround: None

- **CSCvb55487**

  IR8x9 router reboots after setting up energy wise and executing `show energywise` command.

  Conditions: Energy wise has to be set on the router. If it is not show energywise command returns information that it is disabled.

  ```
  configure terminal
  energywise domain iss-lab security shared-secret 0 energywisesecret
  end
  show energywise
  ```

  After last command router reboots itself.

  Workaround: None

- **CSCvf75957**

  Problem Description:

  Bundle install failure/timeout, IOx failure

  Symptoms:

  1. ping to VDS fails:

     ```
     router#ping 127.1.3.1
     ```

  2. bundle install times out

  3. iox applications are not accessible anymore

  Conditions:

  Typically, when the router is left idle for many weeks and months, there is a possibility to observe this when upgrading to the next software image.

Root Cause:

Root cause was that dual modem logs in VDS were not rotating and size increased in time. Due to lack of memory, bundle install attempts failed. Reload the router before reattempting bundle install and image upgrade.

Issue is seen in all software images supporting dual modem [15.6(3)M and beyond]

Workaround:

Reload IOS and system will recover.

- **CSCvd41974**

  Problem Description:

  On IR829 and IR809 platform, there is a Wpan2 interface shown by default in 15.6(3)M2 and beyond software images.

  Condition:

  The show run command will by default show an additional interface, regardless of whether LoRa modem is attached or not.

  ```
  router#show run int wpan 2
  Building configuration...
  Current configuration : 78 bytes
  !
  interface Wpan2
   no ip address
   ieee154 txpower 25
   no ieee154 fec-off
  end
  ```

  Workaround:

  None

Closed Caveats

- **CSCuy45856**

  On the CGR1000 series, bootstrap and flash partitions get corrupted after upgrade.

  Workaround:

  Users are highly recommended to upgrade their CGR1000 routers running any previous releases to the 15.6(3)M version to avoid potential flash corruption, which may completely corrupt and wipe out all the files on both bootstrap and flash partition, rendering the router un-bootable.