Cisco IOS Release 15.6(2)T - 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(2)T and higher releases. These release notes are updated to describe new features, limitations, troubleshooting, recommended configurations, caveats, and how to obtain support and documentation.

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Image Information and Supported Platforms

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

Cisco IOS Release 15.6(2)T includes the following Cisco IOS images:

- ir800-universalk9-bundle.SPA.156-2.T.bin

  This bundle contains the following components:

  - Hypervisor : 0.37 (ir800-hv.srp.SPA.0.37)
  - Guest Operating System: Cisco-GOS,version-1.0.0.2
  - IOS: final version 15.6(2)

- cgr1000-universalk9-bundle.SPA.156-2.T

  - Hypervisor 1.5.8
  - Guest Operating System: Cisco-GOS,version-1.29
  - IOS: final version 15.6(2)T

Cisco IOS Release 15.6(2)T includes support for the following IR800 series routers:

- IR829GW-LTE-GA-EK9
- IR829GW-LTE-GA-ZK9
- IR829GW-LTE-NA-AK9
- IR829GW-LTE-VZ-AK9
- IR809G-LTE-NA-K9
- IR809G-LTE-VZ-K9
- IR809G-LTE-GA-K9

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

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

Note The ir800-universalk9-bundle.SPA.156-2.T.bin bundle must be copied via tftp to the IR800, and then installed using the `bundle install flash:<image name>` command. The ir800-universalk9-bundle.SPA.156-2.T.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.

Major Enhancements

This release includes the following enhancements:

Ignition Power Management, page 3

WAN Monitoring Software (WANMon), page 7

New PID for 4G LTE Module, page 11

New Modem Firmware for the CGR 1000 Connected Grid 4G LTE Module running Cisco IOS, page 11

Ignition Power Management

Ignition Power Management prevents the router from draining the charge of the battery on automotive applications. It also keeps the IR800 up and running while the vehicle is stopped. Therefore, users won't have to wait for routers reload each time the vehicle was stopped. Details about proper wiring to the ignition are found in the Cisco IR829 Industrial Integrated Services Router Hardware Installation Guide.

When the engine is running it generates energy and recharges the battery. When the ignition is turned off, the IR829 can remain operational for a pre-determined period of time. This time period is programmable between 60 to 7200 seconds (2Hours) using the IOS `ignition off-timer` command.

Features of Ignition Power Management

The system software (IOS) tries to prevent the discharge of the battery with the following:

- Turning the router off if the vehicle has the ignition off for a period of time (programmable).
- Turning the router off if the battery voltage drops to a certain level (programmable).
- Attempts to protect the router by turning the router off if the battery voltage rises above a certain level (fixed amount of time).

The system software (IOS) logs the following events to the system log:

- When the user turns on or off the ignition management feature with CLI
- When the ignition is turned on or off
- When the ignition-off timer expires and the system goes off
- When the user enables or disables the feature through the CLI
- Tentatively logs the under-voltage and over-voltage events

Command Line Interface (CLI)

The Ignition Power Management feature of the IR800 series uses a command line interface.

Configuration CLI

The following commands are used to configure the feature.

Enable or Disable ignition power management:

```
ignition enable
[no] ignition enable
```

Ignition off timer value. After the ignition is turned off the router will stay operational for this amount of time, then it shuts down if the ignition is still off:

```
ignition off-timer <value>
```

Over-voltage threshold. If the input voltage drops to levels below this threshold, it will cause the router to shut down

```
ignition undervoltage threshold <value>
```

Status CLI

The following command is used to show the status of the feature.

```
show ignition
```

The following is the expected output:

```
IR800#show ignition
Status:
  Ignition management: Enabled
  Input voltage:       11.8 V
  Ignition status:     Power on
  Shut down timer:     0.0 s to off
Thresholds:
  Undervoltage:        9.0 V
  Overvoltage:         32.0 V
  Undervoltage timer:  60.0 s
  Overvoltage timer:   0.5 s
  Ignition-Off timer:  900.0 s
```

Note While the default value for the IR829 is set to 9 volts, 12.2 volts is a much better value to set in order to provide better battery life to the vehicle

Troubleshooting CLI

A set of CLIs are available for debugging purposes.

Note To turn the debug off, prepend a **no** prefix to the CLI command.

The commands are:

Enable debugging error conditions in the ignition management:

```
debug ignition errors
```

Enable debugging operating events in the ignition management

```
debug ignition events
```

Enable debugging state transitions in the ignition management software:

```
debug ignition states
IR800#debug ignition states
IR800#
*Mar 11 18:59:20.001: %IGNITION-5-IGN_DEBUG_SET: Ignition Management debugging states is
turned on

*Mar 11 18:59:37.217: %IGNITION: Ignition mgmt FSM: IGNITION_MGMT_STATE_IGN_OFF
*Mar 11 18:59:39.679: %IGNITION-5-IGN_TURNED_ON_OFF: The ignition is turned OFF
*Mar 11 18:59:47.065: %IGNITION: Ignition mgmt FSM: IGNITION_MGMT_STATE_PWR_ON
*Mar 11 18:59:49.527: %IGNITION-5-IGN_TURNED_ON_OFF: The ignition is turned ON
```

Enable all debugging conditions at once:

```
debug ignition all

IR800#debug ignition all
IR800#conf t
*Mar 11 19:01:06.737: %IGNITION-5-IGN_DEBUG_SET: Ignition Management debugging all is
turned on
Enter configuration commands, one per line.  End with CNTL/Z.
IR800(config)#igni
IR800(config)#ignition tim
IR800(config)#ignition of
IR800(config)#ignition off-timer 800
IR800(config)#
*Mar 11 19:01:20.357: %IGNITION: handling off-time CLI
*Mar 11 19:01:23.115: %IGNITION: event set off timerdo show ignition
Status:
  Ignition management: Enabled
  Input voltage:       12.2 V
  Ignition status:     Power on
  Shutdown timer:      0.0 s to off
Thresholds:
  Undervoltage:        9.0 V
  Overvoltage:         32.0 V
  Undervoltage timer:  60.0 s
  Overvoltage timer:   0.5 s
  Ignition-Off timer:  800.0 s
```

Turn off debugging:

```
IR800(config)#no igini
IR800(config)#no igni
IR800(config)#no ignition of
IR800(config)#no ignition off-timer ?
  <cr>
```

✎

Note   All debugging commands are cleared through a reboot of the device.

Command Examples

The following examples illustrate the CLI commands and the associated output expected.

Command Examples	Expected Output
| Out of box configuration with no ignition management configured. | ```
IR800#show ignition
Status:
  Ignition management: Disabled
  Input voltage:       11.8 V
  Ignition status:     Power on
  Shutdown timer:      0.0 s to off
Thresholds:
  Undervoltage:        9.0 V
  Overvoltage:         32.0 V
  Undervoltage timer:  60.0 s
  Overvoltage timer:   0.5 s
  Ignition-Off timer:  900.0 s
``` |
| Configure the device for ignition off timer of 60, and ignition under-voltage threshold of 12.2.<br><br>1. Turn vehicle ignition switch off.<br>2. `ignition off-timer 60`<br>3. `ignition undervoltage threshold 12.2`<br>4. `ignition enable` | ```
IR800#show ignition
Status:
  Ignition management: Enabled
  Input voltage:       11.8 V
  Ignition status:     Timing ignition off
shut down
  Shut down timer:     53.0 s to off
Thresholds:
  Undervoltage:        12.2.0 V
  Overvoltage:         32.0 V
  Undervoltage timer:  60.0 s
  Overvoltage timer:   0.5 s
  Ignition-Off timer:  60.0 s
``` |

Default Values

The following default settings apply to Ignition Power Management:

Setting	Value	User Modifiable?
Ignition Power Management Feature	Disabled	Yes
Ignition off timer	15 minutes	Yes
Under-Voltage threshold ✎ **Note** While the default value is set to 9 volts, 12.2 volts is a much better value in order to provide better battery life to the vehicle.	9 Volts	Yes
Under-Voltage timer	60 seconds	No
Over-Voltage threshold	32 Volts	No
Over-Voltage timer	500 milliseconds	No

WAN Monitoring Software (WANMon)

WANMon is a flexible solution to address the WAN link recovery requirements for the following products and interfaces:

- Physical networks: 4G LTE

- Virtual links: Non-crypto map based IPSec tunnels (either legacy or FlexVPN); that is, any IPSec tunnel you configure as an interface.

Note Other link types are not supported.

You enable WANMon to monitor your WAN links and initiate link recovery actions on receipt of link failure triggers.

Built-in Recovery Actions

The following are the three levels of built-in recovery processes specific to the link type:

Link Type	Recovery Actions		
	Level 0 (Immediate)	Level 1 (Active)	Level 2 (Last-Resort)
4G LTE	Clear interface, and then shut/no-shut	Module reload	System reload
Ethernet	Clear interface, and then shut/no-shut	No action taken	System reload
Tunnel	Shut/no-shut	No action taken	System reload

Each level has two time-based thresholds based on which built-in recovery actions are taken. The following are the default settings for each level:

- *threshold* is the wait time in minutes after receipt of a link failure trigger to initiate the recovery action as set in the specified level.

- *mintime* is the frequency to perform the recovery action if the link remains down.

The built-in values are:

Level	threshold	mintime	Description
Level 0	10 min	10 min	Triggers Level 0 actions 10 minutes after the link went down. Repeat no more than every 10 minutes.
Level 1	60 min	60 min	Triggers Level 1 actions 10 minutes after the link went down. Repeat no more than every 60 minutes.
Level 2	480 min	60 min	Triggers Level 2 actions 480 minutes after the link went down. Repeat no more than every 60 minutes.

Note If threshold values are specified as 0, no recovery actions are taken for that level. You can use this to avoid system reload (the built-in Level 2 recovery action) on receipt of a link failure trigger where other WAN links may be operational.

Prerequisites

Ensure that the WANMon module is available. The WANMon module is included in the IOS image as the tm_wanmon.tcl policy file.

Guidelines and Limitations

- WANMon automatically performs IP address checking (no user configuration) as required for the link type:
    - For cellular interfaces, WANMon performs IP address checking only for external dialer configurations, not for dial-on-demand configurations.
    - For 4G LTE interfaces, WANMon always performs IP address checking.
    - For all other interfaces, WANMon never performs IP address checking.
- WANMon indirectly triggers user-specified actions by generating an application event that link resetter applets monitor.
- If your network is live, ensure that you understand the potential impact of any command.

Configuring WANMon

You can enable WANMon on the router and assign WAMMon support to specific interfaces. Optionally, you can override the built-in recovery actions, define custom recovery links, and define an event manager environment policy to set the track object value and disable IP address checking. WANMon is disabled by default.

DETAILED STEPS

	Command	Purpose
Step 1	**event manager policy** tm_wanmon.tcl **authorization bypass**	Enables the WANMon link recovery module. Use **authorization bypass** to avoid authorization for CLIs invoked by this policy.
Step 2	**event manager environment wanmon_if_list**<*instance*> {*interface name* {**ipsla**<*instance*>}}	Configures WANMon for the interfaces in your WAN, and indicates that this is an interface configuration command. **Note** Any environment variable with the prefix wanmon_if_list constitutes an interface configuration. Multiple interfaces are allowed by specifying an instance. Be sure to specify the full interface name (for example, *cellular3/1*). You can set the IP SLA icmp-echo trigger, if desired. Multiple IP SLA triggers are allowed by specifing an instance. **Note** WANMon only looks at the status of the SLA ID. Even though *icmp-echo* is most common, if needed any other type of SLA probe (for example, *udp-echo*) can be used instead.

	Command	Purpose
Step 3	**event manager environment wanmon_if_list***x* {*interface name* {**recovery** *Level0* {*Level1*} *Level2*}}	(Optional) Overrides the built-in thresholds.
Step 4	**publish-event sub-system 798 type 2000 arg1** *<interface name>* **arg2** *<level>*	(Optional) Configures custom recovery actions using link resetter applets. *<interface>* is the full interface name (for example, cellular3/1). *<level>* is 0, 1, or 2 to match the desired link recovery action.
Step 5	{**stub** *<track-stub-id>*}	(Optional) Allows an event manager environment policy to set the track object value. WANMon can set a track-stub-object value to reflect the link state so that an external applet can track the stub object.
Step 6	**event manager environment wanmon_if_list***x* {*<interface name>* {**checkip** *<instance>*}}	(Optional) Disables IP address checking.

EXAMPLES

```
event manager policy tm_wanmon.tcl authorization bypass
```

The following examples are Event Manager commands to configure cellular and Ethernet interfaces:

```
event manager environment wanmon_if_list1 {cellular3/1 {ipsla 1}}
```

```
event manager environment wanmon_if_list2 {eth2/2 {ipsla 2}}
```

This example sets custom recovery thresholds:

```
event manager environment wanmon_if_list {cellular3/1 {recovery 20 {90 75} 600}}
```

where:

- The Level 0 threshold is set to 20 minutes after the link failure trigger. Level 0 recovery actions are performed for the cellular interface. Repeats indefinitely, no more than every 10 minutes (default).

- Level 1 threshold is set to 90 minutes. Level 1 recovery actions are performed for the cellular interface. Repeats no more frequently than every 75 minutes.

- The Level 2 threshold is set to 600 minutes (10 hours).

The following sets the track-stub-object value to 21:

```
conf t
track 21 stub-object
event manager environment wanmon_if_list {cellular3/1 {ipsla 1} {stub 21}}
```

Verifying WANMon Configuration

Use the following steps to verify your WANMon configuration.

DETAILED STEPS

	Command	Purpose
Step 1	**show event manager policy registered**	Displays the WAN monitoring policy.
Step 2	**show event manager environment**	Displays the interface environment variables set during interface configuration.

EXAMPLE

```
show event manager policy registered
1   script   system  multiple          Off   Thu Jan 16 18:44:29 2014  tm_wanmon.tcl
show event manager environment
1 wanmon_if_list              {cell3/1 {ipsla 1}}
```

WANMon Cellular Interface Configuration Example

```
track 1 ip sla 1
ip sla 1
 icmp-echo 172.27.166.250
 timeout 6000
 frequency 300
ip sla schedule 1 life forever start-time now

event manager environment wanmon_if_list {cellular3/1 {ipsla 1}}
event manager policy tm_wanmon.tcl authorization bypass
```

Multiple WAN Link Monitoring Example

```
track 1 ip sla 1
track 21 stub-object
ip sla 1
 icmp-echo 172.27.166.250
 timeout 6000
 frequency 300
ip sla schedule 1 life forever start-time now

track 2 ip sla 2
track 22 stub-object
ip sla 2
 icmp-echo 10.27.16.25
 timeout 6000
 frequency 300
ip sla schedule 2 life forever start-time now

event manager environment wanmon_if_list1 {cellular3/1 {ipsla 1} {stub 21}}
event manager policy tm_wanmon.tcl authorization bypass
```

Related Documentation for WANMon

Configuring WAN Backhaul Redundancy

New PIDs for the IR829

Two new Product IDs for the IR800 series are:

IR829GW-LTE-GA-CK9 — Malaysia

IR829GW-LTE-GA-SK9 — Singapore

New Modem Firmware for the CGR 1000 Connected Grid 4G LTE Module running Cisco IOS

New modem firmware, 3.3.4.3, is available for the CGR 1000 Connected Grid 4G LTE Module running Cisco IOS. An upgrade to this firmware is highly recommend. (CSCux47399) For upgrade details, refer to the "Upgrading the Modem Firmware" section in the Cisco Connected Grid 4G LTE Module Installation and Configuration Guide.

New PID for 4G LTE Module

A new PID, CGM-4G-LTE-MNA-AB (All bands), is supported for the Cisco Connected Grid 4G LTE Module for the CGR 1000 Series routers (CGR 1240 and CGR 1120).

New Key Lifetime Value on the WPAN Module

For the CG-mesh WPAN Module for the CGR 1000 Series routers, the `key lifetime` *value* has changed for the Interface Configuration command, `mesh-security mesh-key interface lifetime` *value*, where value is now: <60-15552000> key lifetime (in seconds). (CSCux96273)

For additional information, see the Cisco Connected Grid WPAN Module for CGR 1000 Series Installation and CG-Mesh Configuration Guide (Cisco IOS).

Related Documentation for the IR800 Series

The following documentation is available:

- Cisco IOS 15.6(2)T 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

- Software manuals - all of the 800 series router documentation

    http://www.cisco.com/c/en/us/support/routers/800-series-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

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(2)T

The following sections list caveats for Cisco IOS Release 15.6(2)T:

Open Caveats

- **CSCuu49331**

  LED status report 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:

  Shutdown the Guest OS before performing a bundle installation.

- **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.

- **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

- **CSCux30741**

  Ignition functions should be disabled when the ignition is disabled.

Conditions: All functions should be disabled (including the under and over voltage protection) when the ignition feature is disabled. Currently under voltage and over voltage protection works even if the ignition management feature is disabled.

Workaround: None

- **CSCuy75089**

  Symptom: On the CG-mesh WPAN Module, you cannot reassign the same power outage server (outage-server {WORD | X:X:X:X: :X}) after you remove it.

  Conditions: User tried to reassign a previously removed power outage server configuration to the CG-mesh WPAN module.

  Workaround: Assign a different value. Do not reuse a power outer server value.

  For additional information, see the Cisco Connected Grid WPAN Module for CGR 1000 Series Installation and CG-Mesh Configuration Guide (Cisco IOS).

- **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

- **CSCuy88101**

  GOS virtual eth0 fails to get link-local IPv6 and global IPv6 addresses.

  Conditions: GOS was configured to obtain global IPv6 address from DHCP server via IOS dhcp relay. At first, the GOS eth0 was able to acquire both link-local IPv6 and global IPv6 addresses. However, after about 5 days, the IPv6 addresses disappeared from the GOS eth0 interface.   All attempts to restart (bring down/up) the eth0 interface and/or dhcp client did not help. It simply failed to obtain any link-local and global IPv6 address. While the IPv6 problem persisted for the GOS eth0, it still could obtain DHCP IPv4 address from IOS and communicates with it using IPv4.

  Workaround: Only rebooting the GOS would help resolve the IPv6 problem for the GOS eth0 interface.

Any Internet Protocol (IP) addresses and phone numbers used in this document are not intended to be actual addresses and phone numbers. Any examples, command display output, network topology diagrams, and other figures included in the document are shown for illustrative purposes only. Any use of actual IP addresses or phone numbers in illustrative content is unintentional and coincidental.