



# Release Notes for Cisco IOS Release 15.2(3)GC and Later

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**Current Release:**

**15.2(3)GC1—April 12, 2013**

**Previous Release:**

**15.2(3)GC — December 20, 2012**

The following release notes support Cisco IOS Releases 15.2(3)GC and higher releases. These releases support the Cisco 5900 Embedded Services Router (ESR). 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

These images are bug compatible with Cisco IOS Release 15.2(3)T1.

**Note**

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

Cisco IOS Release 15.2(3)GC includes the following Cisco IOS images:

- c2900-universalk9-mz.SPA
- c2951-universalk9-mz.SPA
- c3900-universalk9-mz.SPA
- c3900e-universalk9-mz.SPA
- c5915-adventerprisek9-mz.SPA
- c5915-entbase-mz.SPA
- c5940-adventerprisek9-mz.SPA

Cisco IOS Release 15.2(3)GC is supported on the following platforms:

- Cisco 2901 Integrated Services Router
- Cisco 2911 Integrated Services Router
- Cisco 2921 Integrated Services Router
- Cisco 2951 Integrated Services Router
- Cisco 3925 Integrated Services Router
- Cisco 3925e Integrated Services Router
- Cisco 3945 Integrated Services Router
- Cisco 3945e Integrated Services Router
- Cisco 5915 Embedded Services Router
- Cisco 5940 Embedded Services Router

## Related Documentation

The following documentation is available:

- *Software Configuration Guide, Cisco IOS Releases 15.2(2)GC and 15.2(3)GC*  
[http://www.cisco.com/en/US/docs/solutions/GGSG-Engineering/15\\_2\\_2/Config/15\\_2\\_2GC\\_Config\\_Guide.pdf](http://www.cisco.com/en/US/docs/solutions/GGSG-Engineering/15_2_2/Config/15_2_2GC_Config_Guide.pdf)

## New and Changed Information

This section contains the following information:

- [New Hardware and Software Features for Cisco IOS Release 15.2\(3\)GC1, page 3](#)
- [New Hardware and Software Features for Cisco IOS Release 15.2\(3\)GC, page 3](#)
- [New Hardware Features for Cisco IOS Release 15.2\(2\)GC, page 3](#)

- [New Software Features for Cisco IOS Release 15.2\(2\)GC, page 3](#)

## New Hardware and Software Features for Cisco IOS Release 15.2(3)GC1

No new hardware or software features are supported in 15.2(3)GC1.

## New Hardware and Software Features for Cisco IOS Release 15.2(3)GC

No new hardware or software features are supported in 15.2(3)GC.

## New Hardware Features for Cisco IOS Release 15.2(2)GC

No new hardware features are supported in 15.2(2)GC.

## New Software Features for Cisco IOS Release 15.2(2)GC

The following feature has been added to Cisco IOS Release 15.2(2)GC:

- IP Multiplexing

You can use IP multiplexing to optimize IPv4 and IPv6 traffic in environments where packet-per-second transmission limitations cause inefficient bandwidth utilization, such as a satellite network. IP multiplexing addresses this constraint by bundling smaller packets into one larger UDP packet, known as a superframe. The router then sends the superframe to the destination router which demultiplexes the individual packets out of the superframe and routes them to their final destination.

IP multiplexing uses Cisco IOS access control lists (ACLs) to identify outbound packets. You can configure standard, extended, or named ACLs to use with IP multiplexing. IP multiplexing maintains a cache of recent ACL lookup results to optimize traffic classification.

Cisco IOS Release 15.2(2)GC is based on Cisco IOS Release 15.2(2)T. Refer to the following URL for information on the new software features added to Release 15.2(2)T:

[http://www.cisco.com/en/US/docs/ios/15\\_2m\\_and\\_t/release/notes/152-2TNEWFW.html](http://www.cisco.com/en/US/docs/ios/15_2m_and_t/release/notes/152-2TNEWFW.html)

## Limitations

This release has the following limitations:

- The Quality of Service (QoS) policy can only be applied to one outgoing interface the Point-to-Point Protocol over Ethernet (PPPoE) session is traversing.

A QoS output policy can be applied to the Virtual Template or the Virtual Multipoint Interface (VMI), but not at the same time. If a policy is attached, the outgoing physical interfaces (i.e., physical-interface FastEthernet0/0) should not have output policy applied. It is recommended that the policy be attached to the Virtual Template. The other option is to apply the policy to the VMI, but not to the Virtual Template or Ethernet interface.

- When a service policy is applied to the VMI and packets are dropped on the VA due to credit starvation, the **show policy-map int** VMI command will not show these dropped packets. There is no back pressure between the interfaces in this configuration. The VMI does not know that packets were dropped by the Virtual Access (VA) or the Ethernet physical interfaces.
- RFC 5578 credits do not tie into QoS formulas. Credits only indicate to QoS the ability to transmit a packet or not. If there are enough credits a packet will be transmitted from the highest priority queue. When there are not enough credits, packets will be queued.
- QoS policy may drop on an interface when the interface receives an invalid CDR value.
- To prevent dropping QoS policy, the current data rate (CDR) is range checked to a floor value of 10kbps and a ceiling value of the physical interface speed. If CDR is below the floor value, the QoS rate shaping is set to the floor value. If CDR is above the ceiling value, the QoS rate shaping is set to the ceiling value. The floor value is 10kbps. The ceiling value is limited to the physical interface speed.
- In addition to defining floor and ceiling bandwidth values, the class bandwidth percentage must also be 10% or greater. If the class bandwidth is configured to a value less than 10% and the CDR value is less than 10kbps, the QoS policy will be removed (CSCth43582).
- Software Release 15.2(1)GC may have OSPFv3 incompatibility issues while in Mobile Ad Hoc Networks (MANET) mode with software versions 12.4(24)GC or previous versions. To avoid any issues, ensure that all routers run the same version of Cisco IOS.

The Cisco 5915 ESR has the following limitations:

- The Virtual Local Area Network (VLAN) database is maintained in the flash as a file (*vlan.dat*). This file is created or updated only while adding, deleting, or modifying a VLAN to a switchport. Do not delete the *vlan.dat* file.

Copying a configuration, with switch ports configured with VLANs, through Trivial File Transfer Protocol (TFTP) to the Cisco 5915 ESR running configuration, the *vlan.dat* file may not be created automatically in flash. As a result, the VLANs configured in the switch ports do not exist, even though the running config shows the switch ports configured with VLANs. If a VLAN appears as 'Line protocol down' the VLAN association needs to be updated by configuring the VLAN database explicitly by entering the **vlan** *vlan\_number* command.

When you copy any configuration file with VLAN configurations to TFTP server, back up the corresponding *vlan.dat* file to TFTP. And when you copy a configuration file from a TFTP server to the Cisco 5915 ESR, copy the corresponding *vlan.dat* file to C5915 router flash (CSCtq04969).

- When you copy files to the flash, the copy process may become very slow when flash has limited free space. Delete unused files to free up space. If the issue persists, enter the **format flash** command to reclaim space from the deleted files (CSCt142754).
- The Output drops counter may not be accurate under stress. You can verify the number of output drops in output for the **show controller** command (CSCt170552).
- If a Cisco 5915 ESR router port is connected by a straight-through cable to another Cisco 5915 router port, the link does not come up when both the port speed and duplexing is forced on both ends. Use a cross-over cable or enable auto-negotiation on at least one of the connected router ports (CSCts12173).

## Troubleshooting

Use the following command to collect data when reporting router issues:

- **show tech**

Use the following command to collect data to confirm neighbor establishment:

- **show vmi neighbor**

Use the following command to display active PPPoE sessions:

- **show pppoe session**

Use the following command to examine QoS issues:

- **show policy-map interface virtual-access** *interface-number*

Use the following commands to debug VMI issues:

- **debug vmi error**
- **debug vmi pppoe**

Use the following commands to verify PPPoE and VMI interface operation related to credit information:

- **show vmi neighbor detail**
- **show pppoe session all**

Use the following command to debug PPPoE issues:

- **debug pppoe error**

Use the following command to display OSPFv3 traffic data including Link-State Advertisements (LSA) counts:

- **show ospfv3 traffic**

Use the following command to display Enhanced Interior Gateway Routing Protocol (EIGRP) traffic data:

- **show ip eigrp traffic** [*as-number*]

The following command is not supported, but may be useful in debugging EIGRP MANET metric issues:

- **debug eigrp neighbor**

Use the following command to collect data when reporting ROMmon issues:

- **showmon**

Complete the following procedure to collect data if a router reboot to ROMmon occurs:

1. **dir flash:** Use to locate the Route Processor (crashinfo\*) or Network Processor (pxf\_crashinfo\*) exception file.
2. Email the exception file with a write up to the Cisco Customer Support.

Use the following commands to display the IP multiplexing configuration and multiplexing statistics:

- **show ip mux interface**
- **show ipv6 mux interface**
- **show ip mux profile**
- **show ipv6 mux profile**

Use the following command to debug IP multiplexing issues

- **debug ip mux**
- **debug ipv6 mux**

## Recommended Configuration Settings

Use the following configuration guidelines when enabling class-based weighted fair-queuing:

- Enter the following command to turn off creation of virtual-template subinterfaces:

```
no virtual-template subinterface
```

- Enter the following commands to create a policy map with class-based weighted fair-queuing and apply the newly created policy-map to the virtual template:

```
class-map match-any chat
  match dscp af11
class-map match-any voice
  match dscp ef
```

```
policy-map mypolicy
  class chat
    bandwidth percent 40
  class voice
    bandwidth percent 40
```

```
interface virtual-template number
service-policy output mypolicy
```

- No additional configuration is supported on the policy-map.

Use the following configuration guidelines when disabling Point to Point Protocol (PPP) keepalives:

- You can turn off the PPP keepalive messages to decrease overhead when the radio alerts the router with a PPPoE Active Discovery Terminate (PADT) message that the layer-2 RF connection is no longer available. Turning off the PPP keepalive messages may also avoid the potential for the router to terminate the connection based on missed PPP keepalives over a poor radio frequency (RF) link.
- To turn off the PPP keepalive messages, enter the following command for the virtual-template:

```
interface virtual-template number
no keepalive
```

Use the following configuration guidelines for setting the recommended Open Shortest Path First (OSPF) values of radio link metrics:

- You may have to dampen the amount of changes in order to reduce network-wide churn because cost components may change rapidly.
- The following recommended values are intended as a starting point for optimizing an OSPFv3 network and are based on network simulations that may reduce the rate of network changes. Each network may have unique characteristics that require different settings to optimize actual network performance.

You must configure these values for both OSPFv3 IPv4 and IPv6:

S1 = ipv6 ospf dynamic weight throughout

Recommended value = 0

Default=100

S2 = ipv6 ospf dynamic weight resources

Recommended value = 29

Default = 100

S3 = ipv6 ospf dynamic weight latency

Recommended value = 29

Default = 100

S4 = ipv6 ospf dynamic weight L2 factor  
 Recommended value = 29  
 Default = 100

The following is an example configuration for a VMI interface on the virtual template when running bypass mode:

```
interface vmi1
...
ipv6 ospf cost dynamic weight throughput 0
ipv6 ospf cost dynamic weight resources 29
ipv6 ospf cost dynamic weight latency 29
ipv6 ospf cost dynamic weight L2-factor 29
...
ospfv3 cost dynamic weight throughput 0
ospfv3 cost dynamic weight resources 29
ospfv3 cost dynamic weight latency 29
ospfv3 cost dynamic weight L2-factor 29
```

For more information on OSPF commands, refer to the following URL:

[http://www.cisco.com/en/US/docs/ios/iproute\\_ospf/command/reference/iro\\_book.html](http://www.cisco.com/en/US/docs/ios/iproute_ospf/command/reference/iro_book.html)

Use the following configuration guidelines for disabling split horizon in EIGRP:

- By default split horizon is enabled in EIGRP. You can disable split horizon by entering the **no ip split-horizon eigrp** command for the respective autonomous system number.

```
interface vmi number
no ip split-horizon eigrp as-number
```

- Enter the following command to disable the ip redirects on the vmi interface when you are configuring the vmi interface for EIGRP:

```
interface vmi number
no ip redirects
```

Use the following configuration guidelines for setting EIGRP values of radio link metrics:

- EIGRP monitors the following metrics on an interface allowing the tuning of the EIGRP metric calculations; use the metric weights router configuration command:

```
metric weights tos k1 k2 k3 k4 k5
```

where `tos` denotes type of service (currently, it must always be zero) and use the following default values for weights:

```
k1 - 1
k2 - 0
k3 - 1
k4 - 0
k5 - 0
```



**Note** The **no metric weights** command restores the K-values to the defaults listed above.

- Most configurations use the Delay and Bandwidth metrics with Bandwidth taking precedence.
- You must set the weights identically on all routers in an autonomous system.



**Note** If you wish to use the default K-values you do not need to enter the **metric weights** command.

- To set the metric dampening value for EIGRP, enter the following commands for either change-based or interval-based dampening of metric updates received through VMI:

- Change Based Dampening:

```
ip50-1(config)#int vmi 4
ip50-1(config-if)#eigrp 100 interface dampening-change 40
```

Default Value for Change Based Dampening:

50%

To enable change-based dampening using the default Value, enter the following command:

```
eigrp 100 interface dampening-change
```

To disable change-based dampening, enter the following command:

```
no eigrp 100 interface dampening-change
```

- Interval-based Dampening:

```
ip50-1(config)#int vmi 4
ip50-1(config-if)#eigrp 100 interface dampening-interval 20
```

Default Timer value for Interval-based Dampening:

30 seconds

To enable interval-based dampening using the default Value, enter the following command:

```
eigrp 100 interface dampening-interval
```

To disable interval-based dampening, enter the following command:

```
no eigrp 100 interface dampening-interval
```

- The following exceptions will result in an immediate update:
  - a down interface
  - a down route
  - any change in a metric triggered outside the scope of the VMI metric update



**Note** No recommended values other than default are currently available.

For more information on EIGRP commands, refer to:

[http://www.cisco.com/en/US/docs/ios/iproute\\_eigrp/command/reference/ire\\_book.html](http://www.cisco.com/en/US/docs/ios/iproute_eigrp/command/reference/ire_book.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).

This section lists caveats for the following releases:

- [Cisco IOS Release 15.2\(3\)GC1, page 9](#)
- [Cisco IOS Release 15.2\(3\)GC, page 10](#)

## Cisco IOS Release 15.2(3)GC1

The following sections list caveats for Cisco IOS Release 15.2(3)GC1:

- [Open Caveats for Cisco IOS Release 15.2\(3\)GC1, page 9](#)
- [Closed Caveats for Cisco IOS Release 15.2\(3\)GC1, page 9](#)

### Open Caveats for Cisco IOS Release 15.2(3)GC1

There are no open caveats for Cisco IOS Release 15.2(3)GC1.

### Closed Caveats for Cisco IOS Release 15.2(3)GC1

This section lists closed caveats for all platforms running Cisco IOS Release 15.2(3)GC1:

- **CSCts81361**

If a Network Time Protocol (NTP) client is configured with multiple servers of the same stratum, the client does not select a particular server to synchronize with; it instead toggles between the various servers and marks them as falsetickers.

**Workaround:** The workaround is to configure the client to synchronize with a single server.

- **CSCua58799** (5940 Embedded Services Router)

When using Layer 2 Tunneling Protocol Version 3 (L2TPv3), the switch does not allow L2 non-broadcast traffic.

**Workaround:** Configure the interface containing the xconnect endpoint into a bridge group. Here is an example of the additional commands needed (where GE0/1 is one of the L2TPv3 tunnel endpoints):

```
Router(config)# bridge 1 protocol ieee
Router(config)# bridge irb
Router(config)# int gigabitEthernet 0/1
Router(config-if)# bridge-group 1
```

- **CSCud82366** (5915 Embedded Services Router)

The command line interface is missing and ViF1 interface cannot be configured for Multicast Service Reflection.

**Workaround:** There is no workaround.

- **CSCue19814**

Protocol Independent Multicast (PIM) packets are flooded when trunk is enabled on the switch port. This problem is not seen when the trunk port is changed to access port or when PIM is configured in the routed port instead of the VLAN.

**Workaround:** The workaround is to disable IGMP snooping or exclude the PIM-configured VLAN from the trunk port

- **CSCue68199**

Secure Sockets Layer (SSL) Express Acceleration is not applied to connections in a Wide Area Application Services (WAAS) environment.

**Workaround:** There is no workaround.

## Cisco IOS Release 15.2(3)GC

Cisco IOS Release 15.2(3)GC is bug compatible with Cisco IOS Release 15.2(3)T1

The following sections list caveats for Cisco IOS Release 15.2(3)GC:

- [Open Caveats for Cisco IOS Release 15.2\(3\)GC, page 10](#)
- [Open Caveats for Cisco IOS Release 15.2\(3\)GC on the Cisco 5915 ESR, page 10](#)
- [Closed Caveats for Cisco IOS Release 15.2\(3\)GC, page 11](#)

### Open Caveats for Cisco IOS Release 15.2(3)GC

This section lists open caveats for all platforms running Cisco IOS Release 15.2(3)GC:

- **CSCtu07638**

A sporadic traceback may occur when IP multiplexing is configured on an interface with moderate traffic actively multiplexed and demultiplexed over that interface.

**Workaround:** There is no workaround.

- **CSCtx62099**

If the size of the IP mux MTU is larger than the MTU of the outbound interface, a superframe may not be transmitted, or it might be fragmented properly but not re-assembled at the receive side. A format error occurs on the demux interface. This is only an IPv4 issue; IPv6 does not support router packet fragmentation.

**Workaround:** Reduce the MTU size in the profile to the size of the interface MTU.

- **CSCty54465**

Occasionally packets matching an ACL are not filtered. An ACL applied to inbound traffic with IP multiplexing enabled on the interface, may not filter traffic according to the ACL the packet was de-muxed by IP multiplexing.

**Workaround:** If traffic is forwarded, then apply an outbound ACL to the outbound interface to block the missed packets.

- **CSCuc32258**

A video call on any ESR platform between SIP phones comes up without video channel. If the receiving phone puts the phone on hold and resumes the call, the video displays.

**Workaround:** Configure asymmetric payload support for dynamic codecs on the voice service as follows:

```
(conf)# voice service voip
(conf-voi-serv)# sip
(conf-voi-serv)# asymmetric payload dynamic-codecs
```

- **CSCuc73964**

The NTP Core crashes when an interface is brought up

**Workaround:** There is no workaround.

### Open Caveats for Cisco IOS Release 15.2(3)GC on the Cisco 5915 ESR

This section lists open caveats for the Cisco 5915 ESR running Cisco IOS Release 15.2(3)GC:

- **CSCtq80319**

The *No sreloc section* system message may display during boot up. This does not affect the system boot process.

**Workaround:** There is no workaround.

## Closed Caveats for Cisco IOS Release 15.2(3)GC

This section lists closed caveats for all platforms running Cisco IOS Release 15.2(3)GC:

- **CSCty28858**

The **ip verify** and **ip load-sharing** commands are not recognized by the CLI for any interface supporting IPv4. If you enter one of these commands, the system responds with the message:  
% Invalid input detected at '^' marker.

- **CSCtz38516**

Inbound ACLs and traffic-class policing do not work on IP multiplexing superframes.

- **CSCtz75760**

A mix of small and large IPv6 packets being multiplexed and demultiplexed over an interface may cause a memory leak.

- **CSCtz78273**

The performance of an interface configured to multiplex and demultiplex IPv6 packets is lower than and drops packets at a lower threshold than an interface configured to multiplex and demultiplex IPv4 packets.

## Obtaining Documentation, Support, and Security Guidelines

For information on obtaining documentation, submitting a service request, and gathering additional information, see the monthly *What's New in Cisco Product Documentation*, which also lists all new and revised Cisco technical documentation, at the following URL:

<http://www.cisco.com/en/US/docs/general/whatsnew/whatsnew.html>

Subscribe to the What's New in Cisco Product Documentation as a Really Simple Syndication (RSS) feed and set content to be delivered directly to your desktop using a reader application. The RSS feeds are a free service. Cisco currently supports RSS Version 2.0.

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