



Release Notes for Cisco IOS Release 15.4(3)M for the 5900 Series ESR Platforms

These releases support the Cisco 5900 Embedded Services Routers (ESR). These Release Notes are a subset of the overarching Cisco 15.4(3)M Release Notes and are targeted specifically at issues that apply to the Cisco 5900 ESR platforms. 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 the overarching 15.4(3)M release. This release note document covers issues that pertain specifically to the Cisco 5900 ESR platforms. Other issues covered in the overarching release notes also apply to the 5900 ESR platforms, as well

**Note**

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

This document covers the following Cisco IOS images:

- c5915-adventerprisek9-mz.SPA
- c5915-entbase-mz.SPA
- c5921i86-universalk9-ms.SPA
- c5930-adventerprisek9-mz.SPA
- c5940-adventerprisek9-mz.SPA

This document covers Cisco IOS 15.4(3)M releases operating on the following platforms:

- Cisco 5915 Embedded Services Router
- Cisco 5921 Embedded Services Router
- Cisco 5930 Embedded Services Router
- Cisco 5940 Embedded Services Router

Related Documentation

The following documentation is available:

- *Cisco IOS 15.4M&T Configuration Guide:*
<http://www.cisco.com/c/en/us/support/ios-nx-os-software/ios-15-4m-t/products-in-stallation-and-configuration-guides-list.html>
- IOS Bulletins—You can find bulletins at:
<http://www.cisco.com/c/en/us/products/ios-nx-os-software/ios-software-releases-listing.html>

New Features

This section provides the following major sections to introduce the new features supported in Cisco IOS Release 15.4(3)M on the Cisco 5900 ESR platforms.

Cisco Unified Survivable Remote Site Telephony (SRST)

This release introduces support for SRST on the Cisco 5921 ESR platform (support already existed on other ESR platforms).

Cisco Unified Survivable Remote Site Telephony offers:

- Business resiliency through redundant, localized call processing.
- Intelligent and automatic failover configuration without manual IT or telecom intervention.
- Cost-effective operations through a converged voice and data network.
- Centralized IP telephony configuration and management.
- Investment protection and simplified migration.

Detailed information about using SRST can be found at the following link:

<http://www.cisco.com/c/en/us/products/unified-communications/unified-survivable-remote-site-telephony/index.html>

Locator/ID Separation Protocol (LISP)

This release introduces LISP support on all Cisco 5900 ESR platforms.

Locator/ID Separation Protocol (LISP) is routing architecture that provides new semantics for IP addressing. The current IP routing and addressing architecture uses a single numbering space, the IP address, to express two pieces of information:

- Device identity.
- The way the device attaches to the network.

The LISP routing architecture design separates the device identity, or endpoint identifier (EID), from its location, or routing locator (RLOC), into two different numbering spaces. Splitting EID and RLOC functions yields several advantages.

Simplify Routing Operations

LISP enables enterprises and service providers to:

- Simplify multi-homed routing
- Facilitate scalable any-to-any WAN connectivity
- Support data center virtual machine mobility

Improve Scalability and Support

LISP routing architecture also:

- Improves scalability of the routing system through greater aggregation of RLOCs
- Optimizes IP routing for both IPv4 and IPv6 hosts
- Reduces operational complexities

LISP can be gradually introduced into an existing IP network without affecting the network endpoints or hosts.

There are several sources that provide detailed information about LISP. See the following links:

<http://www.cisco.com/go/lisp>

http://www.cisco.com/c/en/us/products/collateral/ios-nx-os-software/locator-id-separation-protocol-lisp/datasheet_c78-576698.html

http://www.cisco.com/c/en/us/products/collateral/ios-nx-os-software/locator-id-separation-protocol-lisp/qa_c67-582925.html

Cisco Wide Area Application Services (WAAS) Express

This release introduces the Cisco® Wide Area Application Services (WAAS) Express support for the Cisco 5921 ESR which offers bandwidth optimization and application acceleration capabilities. The hardware and software requirements are:

- WAAS appliance running WAAS software 5.0.1 or later
- WAAS Central Manager running WAAS software 5.0.1 or later

Table 1 Recommended Sizing

Platform	TCP Connections	WAN Capacity	DRAM Required
5915	30	1.54 Mbps	512 MB
5921	75	4 Mbps	1 GB
5930	75	4 Mbps	1GB
5940	75	4 Mbps	1GB

Use the following configuration guidelines to enable Waas Express:

- Enter the following command to enable Waas Express on the Wan interface:

```
waas enable
```

- Enter the following commands to enable full optimizations:

```
parameter-map type waas waas_global
tfo optimize full
```

- Enter the following commands to enable application accelerators:

```
parameter-map type waas waas_global
accelerator http-express
enable
accelerator cifs-express
enable
accelerator ssl-express
```

enable

Detailed information about using the WAAS Express can be found at the following link:

http://www.cisco.com/en/US/docs/ios-xml/ios/wan_waas/configuration/15-2mt/wan-cfg-waas-exp.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.
- Software Release 15.4(3)M 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.
- 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.

The Cisco 5921 ESR has the following limitations:

- With the 5921 ESR, if the user wishes to configure dot1q trunking, it is suggested that the Linux MTU be set to 1508. This is due to the fact that a frame of length 1500 (maximum, by default) is going to leave the 5921 application with a length of 1504 bytes (if using dot1q and for non-native VLAN) or of 1508 bytes (if using q-in-q and for non-native VLAN). Normally, Linux would either drop or fragment these frames. Configuring the MTU to 1508 in Linux will prevent the fragmentation or dropping of frames in the event that dot1q or q-in-q is configured on the 5921.
- When viewing the IOS configuration, you may notice 'speed' and 'duplex' commands under an interface. The behavior of these commands will be changing in the next release. For now, it is recommended that these settings not be modified or used.
- With the 5921 ESR, several situations have been encountered in which the e1000e Ethernet driver strips VLAN tags before a frame reaches the 5921. This will result in dot1q trunking not performing properly (the 5921 will receive frames with no VLAN tag, even though it is configured to expect VLAN tags). In IOS, you will notice this by seeing ARP or ping failures. If you see such behavior, please issue the following debug command from IOS:

```
#debug arp
```

Now, try the ping again. If the VLAN tag stripping issue is present, you will see a "wrong cable" message similar to the following:

```
*Jan 14 21:49:50.874: IP ARP rep filtered src 192.168.110.2 e05f.b986.5500, dst
192.168.110.1 0022.4d7b.e424 wrong cable, interface Ethernet0/0.130
```

Now switch to the Linux command line and see if the e1000e driver is being used by issuing the following command (using eth0 as an example):

```
[root@router ~]# ethtool -i eth0
driver: e1000e <== LOOK FOR THIS
version: 2.3.2-k
firmware-version: 2.1-2
bus-info: 0000:02:00.0
supports-statistics: yes
supports-test: yes
supports-eprom-access: yes
supports-register-dump: yes
supports-priv-flags: no
```

From the Linux command line, verify the VLAN mode of the device:

```
[root@router ~]# ethtool -d eth0
MAC Registers
-----
0x00000: CTRL (Device control register) 0x58100248
  Endian mode (buffers): little
  Link reset: reset
  Set link up: 1
  Invert Loss-Of-Signal: no
  Receive flow control: enabled
  Transmit flow control: enabled
  VLAN mode: enabled <== LOOK FOR THIS
  Auto speed detect: disabled
  Speed select: 1000Mb/s
  Force speed: no
  Force duplex: no
```

If the VLAN mode is enabled, this indicates that the driver is stripping the VLAN tags.

To remedy this using CentOS, please upgrade to the latest e1000e driver by following these steps from the Linux command line:

```
#yum install kernel-devel gcc gcc-c++ make wget
#reboot

#mkdir /usr/local/src/e1000e
#cd /usr/local/src/e1000e
#wget http://downloadmirror.intel.com/15817/eng/e1000e-3.0.4.tar.gz
#tar xzf e1000e-3.0.4.tar.gz
#cd e1000e-3.0.4
#cd src
#make install
```

If the process ends with the following message, ignore it:

```
/bin/sh: man: command not found
```

```
#rmmod e1000e
#modprobe e1000e
```

From the Linux command line, verify that the new driver has been activated:

```
[root@centos src]# ethtool -i eth0
driver: e1000e
version: 3.0.4-NAPI <== LOOK FOR THIS
firmware-version: 2.1-2
bus-info: 0000:02:00.0
supports-statistics: yes
supports-test: yes
supports-EEPROM-access: yes
supports-register-dump: yes
supports-priv-flags: no
-----
```

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 (CSCt42754).
- 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).

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
```

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.

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).

Open Caveats

- **CSCu197065**
On the 5940, the running configuration would get cleared by randomly power cycling the system.
Workaround: Minimizing power cycles will reduce the chance of encountering this issue.
- **CSCup63812**
On the 5921, the IOS MTU need to be capped to 1500 if linux MTU exceeds 1500

- **CSCud07882**

For the 5921 ESR, when 802.1Q is configured on the IOS interface but is not configured on the Linux interface, max MTU outbound packets will be dropped.

Workaround: Increase the linux mtu by 4 bytes to 1504 instead of 1500. This will allow the 5921 to send full MTU sized packet of 1500 in IOS without Fragmentation.

- **CSCup61110**

If the 5940 does not have a start up configuration, it displays a message that is not informative:

```
Original NVCONFIG doesnt have correct MAGIC number
Backup NVCONFIG also doesnt have correct MAGIC number
```

Workaround: Ignore the message.

- **CSCup68078**

On the 5921, if there is a time mismatch between the IOS time and the Linux host time, a license invalidation error may occur.

Workaround: If your HW platform supports a real-time clock circuit, please ensure that the clock is set to the actual time and date.

If your HW platform does not support a real-time clock circuit, please manually set the time to 1 July 2014 before starting the 5921 application. Please note, this clock setting will not be persistent across reboots or power removals, so it needs to be done each time the platform is booted (before the 5921 is loaded). In CentOS, this can be done by adding the following command in the c5921-swr-init.sh script: `date --set="15 Jul 2014 00:00:00"`

In addition, if your platform does not support a real-time clock, do not use NTP inside IOS.

- **CSCun69568**

A router may occasionally reload when updating the configuration using nested TCL scripts.

Workaround: None

Closed Caveats

- **CSCun11619**

The 5940 now supports turning on the scheduler isr-watchdog.

- **CSCua49735**

The WAAS-Express router crashes when HTTP-Express Accelerator is enabled and HTTP traffic is going through the WAAS-Express router. This condition is only seen if the response header is split across multiple receives on WAASX.

- **CSCuo13216**

When the 5921 is starting up the user would see the following message:

```
WARNING: No HOME environment => No default SWROptions File
```

As long as the user has specified a specific location for the SWROPTIONS file, the warning message can be ignored.

- **CSCun56221**

There existed an issue on the 5940 where the `upgrade rom-monitor preference upgrade` command was not working.

- **CSCun23424**

The TAP interface on the 5921 now supports duplex settings in c5921 in IOS mode.

- **CSCun11206**
On the 5921, in some cases you cannot ping or arp across a dot1q interface. Please see the [Limitations](#) section for suggested workaround.
- **CSCum82563**
Ability to upgrade ROMMON, via the 'upgrade rom-monitor' command, was added to the 5930 and 5940.
- **CSCum79890**
On the 5921, EIGRP update packets were getting lost between the 5921 IOS and linux interface, when DLEP session is established between peers.
- **CSCuj35636**
Performing a shutdown on an interface, in some scenarios, can result in very high CPU utilization. This CPU utilization can be determined by using the Linux application, top. The problem only occurred on the 5921.
- **CSCuo17120**
IOS-IPS inspect not supported on GRE Tunnel and Tunnel Source Interfaces.
- **CSCun62438**
On the 5921, a condition existed where configured r2cp to form two different r2cp sessions over OSPFv3 routing protocol. Peer routers can be reached through the r2cp sessions. But, by removing and re-config r2cp on 5921 interface causing for crash.
- **CSCum46854**
Cisco 5915 router with 'ip mobile router-service' crashes when Ethernet cable is unplugged.
- **CSCum77865**
A router configured to NAT an encrypted (IPsec) GRE tunnel source doesn't actually do the NAT-ing unless CEF is disabled.
Previous Workaround: Disable IP CEF switching ('no ip route-cache cef') on the physical interface, where the data packets arrive that are being forwarded out through the tunnel.
- **CSCum13603**
The 5940 would occasionally reload when making changes to interface IP addresses. This has only been observed when NAT is configured on a VRF.
- **CSCue62144**
A 5921 running under a load could see a jump in CPU usage when running an active console.

Obtaining Documentation and Submitting a Service Request

For information on obtaining documentation, using the Cisco Bug Search Tool (BST), submitting a service request, and gathering additional information, see What's New in Cisco Product Documentation at: <http://www.cisco.com/en/US/docs/general/whatsnew/whatsnew.html>.

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