



Release Notes for Cisco MWR 1941-DC Mobile Wireless Edge Router for Cisco IOS Release 12.2(15)MC2a

July 27, 2004

Cisco IOS Release 12.2(15)MC2a

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These release notes are for the Cisco MWR 1941-DC Mobile Wireless Edge Router for Cisco IOS Release 12.2(15)MC2a. These release notes are updated as needed to describe new features, memory requirements, hardware support, software platform deferrals, and changes to the microcode and related documents.

For a list of the software caveats that apply to Cisco IOS Release 12.2(15)MC2a, see the [“Caveats in Cisco IOS Release 12.2\(15\)MC2a” section on page 9](#). To review the release notes for Cisco IOS Release 12.2, go to www.cisco.com and click **Technical Documents**. Select **Release 12.2** from the Cisco IOS Software drop-down menu. Then click **Cisco IOS Release Notes > Cisco IOS Release 12.2**.

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Introduction

The Cisco MWR 1941-DC Mobile Wireless Edge Router running Cisco IOS Release 12.2(15) MC2a software is a networking platform optimized for use in mobile wireless networks. It extends IP connectivity to the cell site and Base Transceiver Station (BTS), and through a Fast Ethernet interface to the BTS, provides bandwidth-efficient IP transport of voice and data bearer traffic, as well as maintenance, control, and signalling traffic, over the leased line backhaul network between the BTS and leased line termination and aggregation node via compression (cRTP/cUDP) and packet multiplexing (PPPMux and MLPPP). It supports a limited set of interfaces and protocols, but offers high performance at a low cost while meeting the critical requirements for deployment in cell sites, including small size, extended operating temperature range, high availability, and DC input power flexibility.

System Configuration Requirements

When implemented in a Cisco IP Radio Access Network (IP-RAN) solution, the Cisco MWR 1941-DC router requires the following system configuration:

- Cisco IOS 12.2(8) MC2 or a later Cisco IOS Release 12.2 MC software (excluding Cisco IOS Release 12.2(15)MC1a and Cisco IOS Release 12.2(15)MC2b).
- Network Time Protocol (NTP)

Network Time Protocol must be configured. The Cisco MWR 1941-DC router uses NTP to maintain a clocking source for the proper time stamping of system messages and log files.

- Redundancy

When not using the Cisco MWR 1941-DC router in a redundant configuration, the standalone option must be configured from redundancy mode.

When using the Cisco MWR 1941-DC router in a redundant configuration:

- Keepalives under the FE must be set to 1.
- Extended Availability Drop and Insert (EADI) capabilities must be disabled on the router (using the **disable-eadi** global configuration command) to avoid a double-termination situation upon router reboot. If the MWR 1941-DC is not being used in a redundant configuration and EADI is specifically required, you can re-enable EADI using the **no disable-eadi** global configuration command.
- When attaching the MWR 1941-DC to a device that uses spanning tree, portfast must be configured on the device to avoid problems with HSRP at startup.

- Cisco Express Forwarding (CEF)
You cannot disable CEF on the MWR 1941-DC. Commands such as **no ip cef** will display an error message “%Cannot disable CEF on this platform.” Some commands, such as **no ip route-cache cef**, will not return an error message, however, CEF will not be disabled regardless of whether or not an error message is displayed.
- Hot Standby Router Protocol (HSRP)
In case of a tie in priority, HSRP uses the IP address to determine the active router. Therefore, you should ensure that the order of the IP addresses of the E1/T1 interfaces of the active router corresponds to the order of the IP addresses of the E1/T1 interfaces of the standby router.

Memory Recommendations

Table 1 Memory Recommendations for the Cisco MWR 1941-DC Mobile Wireless Edge Router

Platform	Software Image	Flash Memory Recommended	DRAM Memory Recommended	Runs From
Cisco MWR 1941-DC router	mwr1900-i-mz	32 MB Flash	128 MB DRAM	RAM

Determining the Software Version

To determine the version of Cisco IOS software running on your Cisco MWR 1941-DC router, log in to the Cisco MWR 1941-DC and enter the **show version EXEC** command:

```
router> show version
Cisco Internetwork Operating System Software
IOS (tm) 1900 Software (MWR1900-I-MZ), Version 12.2(15)MC2a, EARLY DEPLOYMENT RELEASE
SOFTWARE (fc1)
```

Upgrading to a New Software Release

For general information about upgrading to a new software release, refer to Software Installation and Upgrade Procedures located at the following URL:

http://www.cisco.com/warp/public/130/upgrade_index.shtml

Upgrading to a New ROM Monitor Version

The Cisco MWR 1941-DC router ROM Monitor (ROMMON) consists of two modules:

- A resident module that is not changed during the upgrade procedure.
- An upgradable module that is updated during the upgrade procedure. This is the only module that you will download from Cisco.com.



Note

Before performing this procedure, you must download the new ROMMON image from Cisco.com. The download procedure is the same as downloading Cisco IOS software images.

New and Changed Information

The following sections list the new hardware and software features supported by the Cisco MWR 1941-DC router for Cisco IOS Release 12.2(15)MC software:

- [New Features in the Cisco IOS Release 12.2\(15\)MC2a, page 5](#)
- [New Features in the Cisco IOS Release 12.2\(15\)MC2, page 5](#)
- [New Features in the Cisco IOS Release 12.2\(15\)MC1, page 5](#)

New Features in the Cisco IOS Release 12.2(15)MC2a

No features are introduced in Cisco IOS Release 12.2(15)MC2a.

New Features in the Cisco IOS Release 12.2(15)MC2

No features are introduced in Cisco IOS Release 12.2(15)MC2.

New Features in the Cisco IOS Release 12.2(15)MC1

The following features were introduced in Cisco IOS Release 12.2(15)MC1:

- [Ignoring the IP ID in RTP/UDP Header Compression, page 5](#)
- [Configuring ACFC and PFC Handling During PPP Negotiation, page 6](#)
- [Configuring the cUDP Flow Expiration Timeout Duration, page 7](#)

For information on new features in previous Cisco IOS Release 12.2MC software releases, see the platform release notes:

http://www.cisco.com/univercd/cc/td/doc/product/wireless/ipran/1_0/relnotes/index.htm

Ignoring the IP ID in RTP/UDP Header Compression

With Cisco IOS Release 12.2(8)MC2c, IP ID checking was suppressed in RTP/UDP header compression. With Cisco IOS Release 12.2(15)MC1, a new option has been added to the **ip rtp header-compression** interface configuration command that allows you to enable or suppress this checking. The default is to suppress.

To suppress IP ID checking, issue the following command while in interface configuration mode:

Command	Purpose
Router(config-if)# ip rtp header-compression ignore-id	Suppresses the IP ID checking in RTP/UDP header compression.

To restore IP ID checking, use the **no** form of this command.

This new feature is identified by CSCdz75957.

Configuring ACFC and PFC Handling During PPP Negotiation

With Cisco IOS 12.2(15)MC1, ACFC and PFC handling during PPP negotiation can be configured.

Configuring ACFC Handling During PPP Negotiation

Use the following commands beginning in global configuration mode to configure ACFC handling during PPP negotiation:

	Command	Purpose
Step 1	Router(config)# interface <i>type slot/port</i>	Configures an interface type and enters interface configuration mode.
Step 2	Router(config-if)# shutdown	Shuts down the interface.
Step 3	Router(config-if)# ppp acfc remote { apply reject ignore }	Configures how the router handles the ACFC option in configuration requests received from a remote peer. <ul style="list-style-type: none"> • apply—ACFC options are accepted and ACFC may be performed on frames sent to the remote peer. • reject—ACFC options are explicitly ignored. • ignore—ACFC options are accepted, but ACFC is not performed on frames sent to the remote peer.
Step 4	Router(config-if)# ppp acfc local { request forbid }	Configures how the router handles ACFC in its outbound configuration requests. <ul style="list-style-type: none"> • request—The ACFC option is included in outbound configuration requests. • forbid—The ACFC option is not sent in outbound configuration requests, and requests from a remote peer to add the ACFC option are not accepted.
Step 5	Router(config-if)# no shutdown	Reenables the interface.

Configuring PFC Handling During PPP Negotiation

Use the following commands beginning in global configuration mode to configure PFC handling during PPP negotiation:

	Command	Purpose
Step 1	Router(config)# interface <i>type slot/port</i>	Configures an interface type and enters interface configuration mode.
Step 2	Router(config-if)# shutdown	Shuts down the interface.

	Command	Purpose
Step 3	Router(config-if)# ppp pfc remote { apply reject ignore }	Configures how the router handles the PFC option in configuration requests received from a remote peer. <ul style="list-style-type: none"> • apply—PFC options are accepted and PFC may be performed on frames sent to the remote peer. • reject—PFC options are explicitly ignored. • ignore—PFC options are accepted, but PFC is not performed on frames sent to the remote peer.
Step 4	Router(config-if)# ppp pfc local { request forbid }	Configures how the router handles PFC in its outbound configuration requests. <ul style="list-style-type: none"> • request—The PFC option is included in outbound configuration requests. • forbid—The PFC option is not sent in outbound configuration requests, and requests from a remote peer to add the PFC option are not accepted.
Step 5	Router(config-if)# no shutdown	Reenables the interface.

To restore the default, use the **no** forms of these commands.



Note

For complete details of the ACFC and PFC Handling During PPP Negotiation feature, see the *ACFC and PFC Handling During PPP Negotiation* feature module:

http://www.cisco.com/univercd/cc/td/doc/product/software/ios122/122newft/122limit/122b/122b_15/12b_acf.htm#1025043

Configuring the cUDP Flow Expiration Timeout Duration

To minimize traffic flow corruption, cUDP flows now expire after an expiration timeout duration during which no packets are passed. When this duration of inactivity occurs on a flow at the compressor, the compressor sends a full header upon receiving a packet for that flow, or, if no new packet are received for that flow, makes the CID for the flow available for new use. When a packet is received at the decompressor after the duration of inactivity, the packet is dropped and a context state message is sent to the compressor requesting a flow refresh.

The default expiration timeout is 5 seconds. The recommended value is 8 seconds.



Caution

Failure of performance/latency scripts could occur if the expiration timeout duration is not changed to the recommended 8 seconds.

To configure the cUDP flow expiration timeout duration, issue the following command while in multilink interface configuration mode:

Command	Purpose
Router(config-if)# ppp iphc max-time <i>seconds</i>	Specifies the duration of inactivity, in seconds, that when exceeded causes the cUDP flow to expire. The recommended value is 8.

To restore the default, use the **no** form of this command.

This new feature is identified by CSCeb44623.

Limitations, Restrictions, and Important Notes



Caution

The Cisco MWR 1941-DC router does not support online insertion and removal (OIR) of WAN interface cards. Any attempt to perform OIR on a card in a powered up router might cause damage to the card.



Caution

Removing the compact flash from the Cisco MWR 1941-DC router during a read/write operation might corrupt the contents of the compact flash, rendering it useless. To recover from an accidental removal of or corruption to the compact flash, a maintenance spare with the appropriate bootable Cisco IOS software image might be needed.

Unsupported Cisco IOS Software Features

The Cisco MWR 1941-DC router requires a special version of Cisco IOS software. Not all Cisco IOS software features can be used with the Cisco MWR 1941-DC router as the core routing is handled by the network processor. The following standard Cisco IOS software features are not supported on the Cisco MWR 1900 router:

- Security Access Control Lists
- MPLS
- 802.1Q VLANs
- Frame Relay (FR)
- MLP LFI
- ATM

Upgrading the VWIC-2MFT-T1-DIR Microcode

When upgrading the image on your Cisco MWR 1941-DC router, power cycle the router or perform a microcode reload on the VWIC-2MFT-T1-DIR to ensure that the firmware for the VWIC-2MFT-T1-DIR is updated during the upgrade.

Disabling PPP Multiplexing

To fully disable PPP multiplexing (PPPMux), issue the **no ppp mux** command on the T1 interfaces of the routers at both ends of the T1 link. If PPP multiplexing remains configured on one side of the link, that side will offer to receive PPP multiplexed packets.

MLP LFI Support

MLP LFI is not supported by the Cisco MWR 1941-DC router. Therefore, MLP LFI must be disabled on peer devices connecting to the Cisco MWR 1941-DC router T1 MLP connections.

ACFC and PFC Support on PPP Interfaces

If upgrading to Cisco IOS Release 12.2(8)MC2c or later for the ACFC and PFC support on PPP interfaces, ensure that you upgrade the MGX-RPM-1FE-CP backcard image first. After doing so, immediately upgrade all MWR 1941-DC routers connected to the MGX-RPM-1FE-CP back card.

Caveats in Cisco IOS Release 12.2(15)MC2a

The following sections list and describe the open and closed caveats for the Cisco MWR 1941-DC router running Cisco IOS Release 12.2(15)MC2a. Only severity 1 through 3 caveats are included.

Caveats describe unexpected behavior in Cisco IOS software releases. Severity 1 caveats are the most serious caveats, severity 2 caveats are less serious, and severity 3 caveats are the least serious of these three severity levels.

Caveats in Cisco IOS Releases 12.2 and 12.2 T are also in Cisco IOS Release 12.2(15)MC2a. For information on caveats in Cisco IOS Release 12.2, see *Caveats for Cisco IOS Release 12.2*. For information on caveats in Cisco IOS Release 12.2 T, see *Caveats for Cisco IOS Release 12.2 T*. These two documents list severity 1 and 2 caveats and are located on CCO and the Documentation CD-ROM.

**Note**

If you have an account with Cisco.com, you can use Bug Navigator II to find caveats of any severity for any release. To reach Bug Navigator II, Login to Cisco.com and click **Software Center: Cisco IOS Software: Cisco Bugtool Navigator II**. Another option is to go directly to <http://www.cisco.com/support/bugtools>.

Open Caveats

The caveats listed in this section are open in Cisco IOS Release 12.2(15)MC2a.

- CSCdz37497

Description: When PPPMux and cUDP are configured, during periods of sustained multicast traffic at a rate of 100 pps or more causes a periodic “out-of-sequence” condition in the MWR 1941-DC IOS decompression.

Workaround: Reduce the rate of multicast traffic.

- CSCea73056

Description: During a failover, the MWR 1941-DC router software opens T1/E1 relays on the active router without taking down the multilink interface first. Packets are sent to the disconnected interface for the next several second until the multilink interface is declared down. This condition causes the network management system to not receive SNMP traps generated during the failover.

Workaround: There is currently no workaround.

- CSCea85262

Description: When shutting down a multilink interface, the virtual access (VA) interface associated with the multilink interface flaps.

Workaround: Shut down the subinterface associated with the multilink group.

Resolved Caveats

This section lists the caveats that are resolved in Release 12.2(15)MC2a.

- CSCdz32659

Description: Memory allocation failure (MALLOCFAIL) messages no longer occur for Cisco Discovery Protocol (CDP) processes.

- CSCec16481

A Cisco device running Internetwork Operating System (IOS) and enabled for the Open Shortest Path First (OSPF) Protocol is vulnerable to a Denial of Service (DoS) attack from a malformed OSPF packet. The OSPF protocol is not enabled by default.

The vulnerability is only present in IOS release trains based on 12.0S, 12.2, and 12.3. Releases based on 12.0, 12.1 mainlines and all IOS images prior to 12.0 are not affected. Refer to the Security Advisory for a complete list of affected release trains.

Further details and the workarounds to mitigate the effects are explained in the Security Advisory which is available at the following URL:

<http://www.cisco.com/warp/public/707/cisco-sa-20040818-ospf.shtml>.

- CSCec25430

Description: A Cisco device reloads on receipt of a corrupt CDP packet.

- CSCec55704

Description: The carrier delay detects interface flaps and closes a serial interface even though the carrier delay timer was not exceeded.

- CSCec85345

Description: On occasion, when an MWR 1941-DC router relay closes, syslog messages report the relay as opening.

- CSCed23981

Description: When a PPP multiplexed ICMP echo request is sent to an MWR 1900 series router, the MWR 1941-DC router corrupts the ICMP data payload when de-multiplexing the ICMP packets.

- CSCed40563

Description: Problems with the CDP protocol have been resolved.

- CSCin67568

Description: A Cisco device experiences a memory leak in the CDP process. The device sending CDP packets sends a hostname that is 256 or more characters. There are no problems with a hostname of 255 or fewer characters.

Unreproducible Caveat

The caveat listed in this section has not been reproduced during testing. In the unlikely event you experience the problem described in this section, contact Cisco customer service.

- CSCdz48133

Description: Periods of sustained mixed traffic (UDP multicast, IP, and TCP) might cause the MWR 1941-DC router to crash.

Troubleshooting

Collecting Data for Router Issues

To collect data for reporting router issues, issue the following command:

- **show tech-support**—Displays general information about the router when it reports a problem.

Collecting Data for Redundancy Issues

To collect data for redundancy-related issues, issue the following commands while in EXEC mode:

- **show cdp neighbors**—Displays detailed information about neighboring devices discovered using Cisco Discovery Protocol (CDP).
- **show controllers**—Displays information that is specific to the hardware.
- **show ip interface**—Displays the usability status of interfaces configured for IP.
- **show redundancy**—Displays current or historical status and related information on redundant Dial Shelf Controllers (DSCs).
- **show standby**—Displays Hot Standby Router Protocol (HSRP) information.
- **show standby brief**—Displays Hot Standby Router Protocol (HSRP) information; specifically, with the **brief** keyword specified, a single line of output summarizing each standby group.

Collecting Data for ROMmon Issues

To collect data for ROMmon issues, issue the following command while in EXEC mode:

- **showmon**— Displays currently selected ROM monitor.

Collecting Data for Router Rebooting to ROMmon

If a router reboot to ROMmon occurs, issue the **dir device ID** command where *device ID* is slot0:, and look for the router processor or network processor exception file (crashinfo* or pxf_crashinfo* respectively). Once you have located one of these files, you can email the file along with a description of the problem to your Cisco representative.

Documentation Updates

The following sections describe updates to the published documentation for the Cisco MWR 1941-DC router. The heading in this section corresponds with the applicable section title in the documentation.

Configuring RTP/UDP Compression

The maximum number of RTP header compression connections per MLP bundle is documented as 600 when in fact, up to 1000 connections are supported on an interface. This change also applies to the **ip rtp header-compression** command description.

The show ip rtp header-compression Command

The **detail** keyword is not supported in the **show ip rtp header-compression** command. Therefore, output does not display for the **detail** keyword if it is specified in command.

Configuring T1 Interfaces

Some configuration modes shown in the procedure for configuring T1 interfaces in the “Configuring T1 Interfaces” of the *Cisco MWR 1900 Software Configuration Guide* are incorrect. The correct command modes are as follows:

- Step 1** Specify the controller that you want to configure. For information about interface numbering, see the *Understanding Interface Numbering* section.

```
Router(config)# controller t1 slot/port
```

- Step 2** Specify the framing type.

```
Router(config-controller)# framing esf
```

- Step 3** Specify the line code format.

```
Router(config-controller)# linecode b8zs
```

- Step 4** Specify the channel group and time slots to be mapped. For the VWIC interfaces, you can configure two channel-groups (0 and 1) on the first T1 port or you can configure one channel-group (0 or 1) on each T1 port. Once you configure a channel group, the serial interface is automatically created.



Note

The default speed of the channel group is 56. To get full DS0/DS1 bandwidth, you must configure a speed of 64.

```
Router(config-controller)# channel-group 0 timeslots 1-24 speed 64
```

- Step 5** Configure the cable length.

```
Router(config-controller)# cablelength feet
```



Note

Although you can specify a cable length from 0 to 450 feet, the hardware only recognizes two ranges: 0 to 49 and 50 to 450. For example, entering 35 feet uses the 0 to 49 range. If you later change the cable length to 40 feet, there is no change because 40 is within the 0 to 49 range. However, if you change the cable length to 50, the 50 to 450 range is used. The actual number you enter is stored in the configuration file.

- Step 6** Exit controller configuration mode.

```
Router(config-controller)# exit
```

- Step 7** Configure the serial interface. Specify the T1 slot (always 0), port number, and channel group.

```
Router(config)# interface serial slot/port:0
```

- Step 8** Assign an IP address and subnet mask to the interface. If the interface is a member of a Multilink bundle (MLPPP), then skip this step.

```
Router(config-if)# ip address ip_address subnet_mask
```

- Step 9** Before you can enable RTP header compression, you must have configured a serial line that uses PPP encapsulation. Enter the following command to configure PPP encapsulation.

```
Router(config-if)# encapsulation ppp
```

- Step 10** Set the carrier delay for the serial interface.

```
Router(config-if)# carrier-delay number
```

Step 11 Return to [Step 1](#) to configure the second port on the VWIC and the ports on any additional VWICs.

Step 12 Exit to global configuration mode.

```
Router(config-if)# exit
```

Configuring Redundancy

Before configuring redundant MWR 1941-DC routers as described in the “Configuring T1 Interfaces” section of the *Cisco MWR 1900 Software Configuration Guide*, ensure that you disable EADI capabilities on the router by issuing the **disable-eadi** global configuration command as follows:

```
Router(config)# disable-eadi
```

Related Documentation

The following sections describe the documentation available for the Cisco MWR 1941-DC router. These documents consist of hardware and software installation guides, Cisco IOS configuration guides and command references, system error messages, and other documents.

Documentation is available as printed manuals or electronic documents.

Platform-Specific Documents

These documents are available for the Cisco MWR 1941-DC router on Cisco.com and the Documentation CD-ROM:

- Cisco MWR 1941-DC Mobile Wireless Edge Router
 - *Cisco MWR 1941-DC Hardware Installation Guide*
 - *Cisco MWR 1900 Software Configuration Guide*
 - *Cisco MWR 1941-DC Rack Mounting Instructions*
 - *Cisco MWR 1941-DC Regulatory Compliance and Safety Information*
- *VWIC-2MFT-T1-DIR, VWIC-2MFT-E1-DIR Installation Instructions*
- *MGX-RPM-1FE-CP Back Card Installation and Configuration Note*

On Cisco.com at:

Technical Documents: Wireless: Mobile Wireless Products: Cisco Radio Access Network Products: Cisco Mobile Wireless IP-RAN

On the Documentation CD-ROM at:

Wireless: Mobile Wireless Products: Cisco Radio Access Network Products: Cisco Mobile Wireless IP-RAN

Feature Modules

Feature modules describe new features supported by Cisco IOS Release 12.2 MC and are updates to the Cisco IOS documentation set. A feature module consists of an overview of the feature, configuration tasks, and a command reference.

On Cisco.com at:

Technical Documentation: Cisco IOS Software: Cisco IOS Release 12.2: New Feature Documentation:12.2-Based New Features: New Features in Release 12.2 MC

Obtaining Documentation

Cisco documentation and additional literature are available on Cisco.com. Cisco also provides several ways to obtain technical assistance and other technical resources. These sections explain how to obtain technical information from Cisco Systems.

Cisco.com

You can access the most current Cisco documentation at this URL:

<http://www.cisco.com/univercd/home/home.htm>

You can access the Cisco website at this URL:

<http://www.cisco.com>

You can access international Cisco websites at this URL:

http://www.cisco.com/public/countries_languages.shtml

Ordering Documentation

You can find instructions for ordering documentation at this URL:

http://www.cisco.com/univercd/cc/td/doc/es_inpk/pdi.htm

You can order Cisco documentation in these ways:

- Registered Cisco.com users (Cisco direct customers) can order Cisco product documentation from the Ordering tool:
<http://www.cisco.com/en/US/partner/ordering/index.shtml>
- Nonregistered Cisco.com users can order documentation through a local account representative by calling Cisco Systems Corporate Headquarters (California, USA) at 408 526-7208 or, elsewhere in North America, by calling 800 553-NETS (6387).

Documentation Feedback

You can send comments about technical documentation to bug-doc@cisco.com.

You can submit comments by using the response card (if present) behind the front cover of your document or by writing to the following address:

Cisco Systems
Attn: Customer Document Ordering
170 West Tasman Drive
San Jose, CA 95134-9883

We appreciate your comments.

Obtaining Technical Assistance

For all customers, partners, resellers, and distributors who hold valid Cisco service contracts, Cisco Technical Support provides 24-hour-a-day, award-winning technical assistance. The Cisco Technical Support Website on Cisco.com features extensive online support resources. In addition, Cisco Technical Assistance Center (TAC) engineers provide telephone support. If you do not hold a valid Cisco service contract, contact your reseller.

Cisco Technical Support Website

The Cisco Technical Support Website provides online documents and tools for troubleshooting and resolving technical issues with Cisco products and technologies. The website is available 24 hours a day, 365 days a year at this URL:

<http://www.cisco.com/techsupport>

Access to all tools on the Cisco Technical Support Website requires a Cisco.com user ID and password. If you have a valid service contract but do not have a user ID or password, you can register at this URL:

<http://tools.cisco.com/RPF/register/register.do>

Submitting a Service Request

Using the online TAC Service Request Tool is the fastest way to open S3 and S4 service requests. (S3 and S4 service requests are those in which your network is minimally impaired or for which you require product information.) After you describe your situation, the TAC Service Request Tool automatically provides recommended solutions. If your issue is not resolved using the recommended resources, your service request will be assigned to a Cisco TAC engineer. The TAC Service Request Tool is located at this URL:

<http://www.cisco.com/techsupport/servicerequest>

For S1 or S2 service requests or if you do not have Internet access, contact the Cisco TAC by telephone. (S1 or S2 service requests are those in which your production network is down or severely degraded.) Cisco TAC engineers are assigned immediately to S1 and S2 service requests to help keep your business operations running smoothly.

To open a service request by telephone, use one of the following numbers:

Asia-Pacific: +61 2 8446 7411 (Australia: 1 800 805 227)

EMEA: +32 2 704 55 55

USA: 1 800 553 2447

For a complete list of Cisco TAC contacts, go to this URL:

<http://www.cisco.com/techsupport/contacts>

Definitions of Service Request Severity

To ensure that all service requests are reported in a standard format, Cisco has established severity definitions.

Severity 1 (S1)—Your network is “down,” or there is a critical impact to your business operations. You and Cisco will commit all necessary resources around the clock to resolve the situation.

Severity 2 (S2)—Operation of an existing network is severely degraded, or significant aspects of your business operation are negatively affected by inadequate performance of Cisco products. You and Cisco will commit full-time resources during normal business hours to resolve the situation.

Severity 3 (S3)—Operational performance of your network is impaired, but most business operations remain functional. You and Cisco will commit resources during normal business hours to restore service to satisfactory levels.

Severity 4 (S4)—You require information or assistance with Cisco product capabilities, installation, or configuration. There is little or no effect on your business operations.

Obtaining Additional Publications and Information

Information about Cisco products, technologies, and network solutions is available from various online and printed sources.

- Cisco Marketplace provides a variety of Cisco books, reference guides, and logo merchandise. Visit Cisco Marketplace, the company store, at this URL:

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

- The Cisco *Product Catalog* describes the networking products offered by Cisco Systems, as well as ordering and customer support services. Access the Cisco Product Catalog at this URL:

<http://cisco.com/univercd/cc/td/doc/pcat/>

- *Cisco Press* publishes a wide range of general networking, training and certification titles. Both new and experienced users will benefit from these publications. For current Cisco Press titles and other information, go to Cisco Press at this URL:

<http://www.ciscopress.com>

- *Packet* magazine is the Cisco Systems technical user magazine for maximizing Internet and networking investments. Each quarter, Packet delivers coverage of the latest industry trends, technology breakthroughs, and Cisco products and solutions, as well as network deployment and troubleshooting tips, configuration examples, customer case studies, certification and training information, and links to scores of in-depth online resources. You can access Packet magazine at this URL:

<http://www.cisco.com/packet>

- *iQ Magazine* is the quarterly publication from Cisco Systems designed to help growing companies learn how they can use technology to increase revenue, streamline their business, and expand services. The publication identifies the challenges facing these companies and the technologies to help solve them, using real-world case studies and business strategies to help readers make sound technology investment decisions. You can access iQ Magazine at this URL:

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

- *Internet Protocol Journal* is a quarterly journal published by Cisco Systems for engineering professionals involved in designing, developing, and operating public and private internets and intranets. You can access the Internet Protocol Journal at this URL:

<http://www.cisco.com/ipj>

- World-class networking training is available from Cisco. You can view current offerings at this URL:

<http://www.cisco.com/en/US/learning/index.html>

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