Release Notes for Cisco uMG9850 QAM Module, Cisco IOS Release 12.1(20)EU1

April 14, 2005

These release notes describe the features, memory requirements, and hardware and software requirements in Cisco IOS release 12.1(20)EU1 to support the Cisco uMG9850 QAM Module on Cisco Catalyst 4500 series switches.

Note Use these release notes with *Release Notes for Cisco Catalyst 4500 Series Switch, Cisco IOS Release 12.1(20)EW* located on Cisco.com. Refer to Related Documentation, page 12.

These release notes discuss the following topics:

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Introduction

Cisco IOS Release 12.1(20)EU1 is an Early Deployment (ED) release based on Cisco IOS Release 12.1(20)EW.

Note Although Cisco IOS Release 12.1(20)EU1 is compatible with Cisco IOS Release 12.1(20) EW, it is designed to support the functionality of the Cisco uMG9850 in VoD applications. Not all features applicable to traditional switching apply to the Cisco uMG9850. For configuration instructions and the command reference for the Cisco uMG9850, refer to *Configuring the Cisco uMG9850 QAM Module* in Related Documentation, page 12

The Cisco uMG9850, designed for the Cisco Catalyst 4500 series switches, provides video-on-demand (VoD) services for a hybrid fiber-coaxial (HFC) cable network. It accepts Moving Pictures Expert Group-2 (MPEG-2) digital video from an IP network, and outputs the video as a quadrature amplitude modulated (QAM) RF stream that can be received by digital set-top boxes (STBs) over the cable network.

System Requirements

This section describes the system requirements for Cisco IOS Release 12 1(20)EU1:

- Memory
- Supported hardware
- Supported features
- Unsupported features

Memory Requirements

Minimum memory and flash configuration on the Cisco Catalyst 4500 series switch is sufficient to support the Cisco uMG9850 QAM Module.

Hardware Compatibility

Table 1 lists hardware that is compatible with the Cisco uMG9850 QAM Module when used with Cisco IOS Release 12.1(20)EU1.

Table 1   Hardware Compatibility

	Product Number	Description	Notes
Cisco Catalyst Switches	WS-C4506	Cisco Catalyst 4506 switch chassis	
	WS-C4507R	Cisco Catalyst 4507R switch chassis	
Supervisor Engine	WS-X4515	Cisco Catalyst Supervisor Engine IV	
Power Supplies	PWR-C45-1000AC	1000 W AC power supply	For either switch chassis, can be configured with up to three Cisco uMG9850 QAM Modules. With four or five modules inserted, the 1400W (AC or DC) power supply must be used.
	PWR-C45-1000AC/2	Redundant power supply	Can be configured along with the 1000 W AC power supply.
	PWR-C45-1400DC-P	1400 W DC power supply	For either switch chassis, can be configured with up to five Cisco uMG9850 QAM Modules.
	PWR-C45-1400DC-P/2	Redundant power supply	Can be configured along with the 1400 W DC power supply.
	PWR-C45-1400AC	1400 W AC power supply	For either switch chassis, can be configured with up to five Cisco uMG9850 QAM Modules.
	PWR-C45-1400AC/2	Redundant power supply	Can be configured along with the 1400 W AC power supply.
Switching Modules	WS-X4148-RJ	48-port 10/100 Fast Ethernet RJ-45 switching module	
	WS-X4306-GB	6-port 1000BASE-X (GBIC) Gigabit Ethernet switching module	
SFPs	GLC-SX-MM=	1000BASE-SX SFP	
	GLC-LX-SM=	1000BASE-LX SFP	
	CWDM-SFP-XXXX=	Cisco CWDM SFP	XXXX=wavelength

Software Compatibility

The Cisco uMG9850 QAM Module is currently supported only in Cisco IOS Release 12.1(20)EU1. Images for this release are listed in Table 2 on page 4 and are available from Cisco.com at the following URL:

http://www.cisco.com/cgi-bin/Software/Iosplanner/Planner-tool/iosplanner.cgi?get_crypto=&data_from=&hardware_name=&software_name=&release_name=12.1.20-EU1&majorRel=12.1&state=:RL&type=Early%20Deployment

Table 2   Cisco IOS Software Release 12.1(20)EU1 Images and Features

Image	Description
cat4000-i9su3-mz	Cisco IOS software for the Cisco uMG98250 QAM Module—Basic MPEG-2 digital video gateway software image, including Routing Information Protocol (RIP) v1 and v2, and static routes.
cat4000-i5su3-mz	Cisco IOS software for the Cisco uMG98250 QAM Module—Enhanced MPEG-2 digital video gateway plus routing software image, including Open Shortest Path First (OSPF), Intermediate System to Intermediate System (IS-IS), Interior Gateway Routing Protocol (IGRP), and Enhanced IGRP (EIGRP).

Determining the Software Version

To determine the version of Cisco IOS software running on a Cisco Catalyst 4500 series switch, log in to the switch and enter the **show version** EXEC command:

```
Switch> show version

Cisco Internetwork Operating System Software
IOS (tm) Catalyst 4000 L3 Switch Software (cat4000-cat4000-i9su3-mz), Version
12.1(20)EU1, EARLY DEPLOYMENT RELEASE SOFTWARE (fc1)
```

Upgrading to a New Software Release

For information on upgrading software in your Cisco Catalyst 4500 series switch, refer to *Release Notes for the Catalyst 4500 Series Switch, Cisco IOS Release 12.1(20)EW.*

New and Changed Information

This section describes new or changed information in Release 12l1(20)EU1.

Emulation Mode

In this release, the Cisco uMG9850 is able to emulate the user datagram protocol (UDP) port mapping of third-party QAM gateways that accommodate fixed QAM-channel groups of eight channels each. Up to three eight-channel gateways can be emulated. The user's mappings are converted to the scheme used by the Cisco uMG9850, and then are reconverted to the user's mapping scheme.

The Cisco uMG9850 can also accommodate VoD streams destined for a Cisco uMG9820 QAM Gateway. This allows the streams to be redirected to a Cisco uMG9850 in architectures that support that QAM module. Mapping schemes for some third-party gateways and the Cisco uMG9820 are presented below.

Conditions and Constraints

Note the following conditions and constraints:

- You must first establish a VLAN, using the command **video** *slot* **route vlan**.

- You need to establish only one IP address. The additional second or third IP address is added automatically, based on the address established in the previous step.

- Additional IP addresses apply only to bitwise and eight-channel QAM gateways.

- If emulation mode is active, the command **no video** *slot* **route** is not allowed. Use the command **no video** *slot* **emulation-mode** to disable emulation mode.

- If emulation mode is active, user-defined mappings are not allowed, through either the commands **video session** or **video udp**.

- If any user-defined port map has been configured, the emulation mode command is denied, with a warning to remove the map first.

Third-Party Bitwise Mapping Scheme

Table 3 presents a sample bitwise mapping scheme for a third-party QAM gateway.

Table 3   Third-Party Mapping Scheme for UDP Port Numbers

QAM channel								Session number							
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0

- For bits 15 to 8, one bit represents one QAM channel. QAM channels range from 1 to 8.

- Session (program) numbers range from 1 to 255.

- *Example*: UDP port number 0x1007 represents the following:

    QAM channel 5, program number 7

> **Note**   If fewer than three IP addresses are chosen, the QAM channels that would be associated with those addresses are unused.

Third-Party Bytewise Mapping Scheme

The QAM channels and session numbers are partitioned as in Table 3.

- Session (program) numbers range from 1 to 255.

- In this scheme, the QAM channels are represented by whole one-byte values. QAM channels range from 1 to 8.

- *Example*: UDP port number 0x1607 represents the following:

    QAM channel 22, program number 7

> **Note**   If fewer than three IP addresses are chosen, the QAM channels that would be associated with those addresses are unused.

Cisco uMG9820 QAM Gateway Bytewise Mapping Scheme

The QAM channels and session numbers are partitioned as in Table 3 on page 5.

- Session (program) numbers range from 1 to 255.

- In this scheme the QAM channels are represented by whole one-byte values. QAM channels range from 1 to 24. IP packets can be mapped to any of the 24 QAM channels

- *Example*: UDP port number 0x1607 represents the following:

   QAM channel 22, program number 7

- *Example*: Cisco uMG9850 in slot 4. The second IP address is mapped to QAM channel 19. Program 7 on channel 19 (UDP port 0x1307) is mapped to 0xE267 (11 100 010011 00111).

To accommodate the UDP port mapping schemes used by the Cisco uMG9820 QAM Gateway and third-party QAM gateways that may already be installed in a VoD network, it is possible to use an emulation mode command option. For example, where a third-party QAM gateway supports fixed groups of eight QAM channels, the emulation feature accommodates up to three sequential IP addresses—one for each eight-channel group, as shown in Table 4.

Table 4   IP Addresses and QAM Assignments for Gateways with Eight-QAM Groups

Number of 8-QAM Gateways	IP Address	QAM Assignment
1	1	1–8
2	2	9–16
3	3	17–24

- The mapping scheme used in emulation mode conforms with the scheme used by the Cisco uMG9820.

- The user enters only one IP address with the command. The other addresses are configured automatically.

Configuration Examples

The syntax of the command is as follows:

[no] video *slot* **emulation-mode [bitwise | 8-qam-number | 24-qam-number] [number-ip-address** *number* **]**

where

- **bitwise** sets bitwise emulation mode

- **8-qam-number** and **24-qam number** set 8- and 24-QAM-channel emulation mode, respectively

- **number-ip-address** selects the number of IP addresses (where applicable) to assign, and *number* is the value 1, 2, or 3

Note   The option **bitwise** without the number option automatically sets three IP addresses. The option **24-qam-number** without the **number** option automatically sets one IP address.

The following example shows how to set bitwise emulation mode with a single IP address on a Cisco uMG9850 in slot 4:

```
Switch(config)# video 4 emulation-mode bitwise number 1
```

The following example shows how to set bitwise emulation mode with three IP addresses (default) on a Cisco uMG9850 in slot 4:

```
Switch(config)# video 4 emulation-mode bitwise
```

The following example shows how to set bytewise 8-QAM-channel emulation mode with three IP addresses (default) on a Cisco uMG9850 in slot 4:

```
Switch(config)# video 4 emulation-mode 8-qam-number 2
```

The following example shows how to set 8-QAM-channel emulation mode with two IP addresses on a Cisco uMG9850 in slot 4:

```
Switch(config)# video 4 emulation-mode 8-qam-number 2
```

The following example shows how to set 24-QAM-channel emulation mode with a single IP address (only one address is supported in this mode) on a Cisco uMG9850 in slot 4:

```
Switch(config)# video 4 emulation-mode 24-qam-number
```

The following example shows how to enable default and manual UDP port mapping on a Cisco uMG9850 in slot 4:

```
Switch(config)# no video 4 emulation-mode
```

Program Data Delivery

The VoD Program Data Delivery (PDD) support provided by the Cisco uMG9850 makes possible the delivery of electronic program guide (EPG) data, other client data, and navigation data to a VoD client application running on the set-top box, enabling the VoD subscriber to browse and select content for viewing. Most cable systems deliver such data through one or more in-band carousels to which the VoD client tunes at startup, as well as during program navigation, as needed.

Program-related information is streamed from a server, and can be delivered to subscribers inband through the Cisco uMG9850. The data is encapsulated as single program transport stream (SPTS) MPEG-2 streams delivered by means of IP/UDP, as regular VoD sessions are. However, program data, unlike a normal VoD SPTS, can be delivered by means of multicast as well as unicast.

Because of limitations of program data servers, a single copy of a program data stream is sent to a Cisco uMG9850 QAM channel, where the stream can be cloned to one, several, or all QAM channels. Also, the program data stream may contain program clock references (PCRs), or may be a pure data stream without timing information. To support PDD and similar functionality, the Cisco uMG9850 remaps the PID, either by using the default map or a user-specified configuration.

PDD functionality on the Cisco uMG9850 supports the following:

- Multicast
- Cloning
- Programs having up to 31 elementary streams

Configuring PDD Features

The procedures in this section show you how to do the following in support of PDD:

- Clone a unicast UDP session to one, several, or all QAM channels on a Cisco uMG9850 with a specified output-program number.

- Clone a single copy of a PDD stream, or a multicast session, to one, several, or all QAM channels on a Cisco uMG9850.

- Use emulation mode to clone a stream or session. In emulation mode, the destination UDP port number determines the output QAM channel and program number.

PDD Conditions and Restrictions

Note the following conditions and restrictions:

- A UDP port can be either clonable or not.
  - Configure nonclonable UDP ports in QAM subinterface configuration mode.
  - Configure clonable UDP ports in global configuration mode.

- Multicast sessions are clonable by default. They can be configured only in global configuration mode.

- There can be only one copy of an input session per QAM channel. If the user enters a conflicting number, an error message appears, as in the following example:

```
uMG9850(config)# video 4 udp 257 q4/1.1 prog 35

Udp port 257 already mapped to QAM4/1/1
```

- For a unicast or multicast session to be mapped to all QAM channels, it must not have been configured previously. Also, the selected output-program number must not have been used previously.

Cloning a Unicast UDP Session to One, Several, or All QAM Channels on a Module

You can map a unicast input UDP session to one, several, or all QAM channels, or a Cisco uMG9850 with a specified output-program number. Program numbers can vary.

> Note Both default UDP ports and user-defined UDP ports can be cloned. The following example illustrates the cloning of user-defined UDP ports.
>
> To clone default UDP ports, you must use program 26 and above.

This example shows UDP session 60000 being cloned on QAM channels 1, 5, 9, and 13 on a Cisco uMG9850 in slot 3.

```
Switch(config)# video 3 udp 60000 qam 3/1.1 program 1
Switch(config)# video 3 udp 60000 qam 3/3.1 program 3
Switch(config)# video 3 udp 60000 qam 3/5.1 program 5
Switch(config)# video 3 udp 60000 qam 3/7.1 program 7
```

This example shows a UDP session being mapped to all 24 QAM channels with a specified output program number.

```
Switch(config)# video 3 udp 60000 all program 1
```

Cloning a PDD Stream or Multicast UDP Session to One, Several, or All QAM Channels on a Module

You can map a PDD stream or multicast session to one, several, or all QAM channels on a Cisco uMB9850. It is assumed that the multicast source is on one VLAN, and the Cisco uMG9850 is on another VLAN.

Note In the following examples, the Cisco uMG9850 is in slot 3, on VLAN 5, and the multicast source is on VLAN 4.

This example maps an input multicast session to QAM channels 1, 5, 9, and 13 on a Cisco uMG9850 in slot 3, specifying output program 1.

```
Switch(config)# video 3 multicast source-address 192.168.4.10 dest-address 224.2.129.116
qam 3/1.1 program 1

Switch(config)# video 3 multicast source-address 192.168.4.10 dest-address 224.2.129.116
qam 3/3.1 program 1

Switch(config)# video 3 multicast source-address 192.168.4.10 dest-address 224.2.129.116
qam 3/5.1 program 1

Switch(config)# video 3 multicast source-address 192.168.4.10 dest-address 224.2.129.116
qam 3/7.1 program 1
```

This example enables multicast sessions, mapping an input multicast session to all QAM channels in a Cisco uMG9850 with a specified output program number.

```
Switch(config)# video 3 multicast source-address 192.168.4.10 dest-address 224.2.129.116
all program 1
```

Using Emulation Mode to Clone a Session

You can configure the Cisco uMG9850 to operate in a variety of emulation modes. Emulation mode supports cloning and multicast. In these cases, the value of the destination UDP port determines the output QAM and program number.

Caution When ports are cloned, conflicts among output-program numbers can occur. The user is responsible for avoiding such conflicts. Also, you cannot clone to program numbers 1–25. Use numbers 26 and above.

Note In the following example, 24-QAM emulation mode is used, as for a Cisco uMG9820 gateway. UDP port 0x011a maps to QAM channel 2, program 3. The configuration clones this to QAM channel 4, program 26.

This example configures the Cisco uMG9850 for 24-QAM emulation mode.

```
Switch(config)# video 3 emulation-mode 24-qam-number
```

This example clones the preceding to QAM channel 4, program 26.

Caution This can conflict with another UDP port 0x011a (decimal 282, binary 100011010). Ensure that you do not assign a UDP port used for another stream.

```
Switch(config)# video 3 udp 0x011a qam 3/2.2 program 26
```

New MIBs

There are no new MIBs in this release.

Limitations and Restrictions

This section lists limitations or restrictions of the functionality of this release.

Interleaver Settings and MPEG Analyzers

The default interleaver setting (128,4) may not work with some MPEG analyzers, such as the Tektronix MTM400 MPEG Transport Stream Monitor. Other interleaver settings should be used.

Emulation Mode

Emulation mode does not support PID-remapping or PID filtering.

Caveats

Caveats describe unexpected behavior in Cisco IOS Release 12.1(20)EU1 specific to the Cisco uMG9850 QAM Module. Workarounds are provided where available.

Open Caveats—Release 12.1(20)EU1

This section lists the open caveats for Cisco IOS Release 12.1(20)EU1.

- CSCef22680

  The MIB values for cvnOutQamPmtInterval and cvnOutPatInterval are incorrect. If the PSI interval is set at the chassis level, then the QAM level should be set with the same value.

Resolved Caveats—Release 12.1(20)EU1

This section lists caveats resolved in Cisco IOS Release 12.1(20)EU1.

- CSCed63714, CSCed74155

  Under some conditions, when a VoD source sends noncompliant MPEG packets, there is a potential for the Cisco uMG9850 to reset.

  Resolution: (1) Check your VoD source to be sure it is not sending noncompliant MPEG packets. (2) Reload the Cisco Catalyst 4500 series switch.

- CSCed67746

  Removing user-defined UDP sessions for a QAM interface does not revert to default mapping.

- CSCed69522

  The maximum and average jitter measurements may not be calculated correctly for active sessions.

Note Caveats CSCef44699 and CSCef60659 are identical.

- CSCef44699

  A document that describes how the Internet Control Message Protocol (ICMP) could be used to perform a number of Denial of Service (DoS) attacks against the Transmission Control Protocol (TCP) has been made publicly available. This document has been published through the Internet Engineering Task Force (IETF) Internet Draft process, and is entitled "ICMP Attacks Against TCP" (draft-gont-tcpm-icmp-attacks-03.txt).

  These attacks, which only affect sessions terminating or originating on a device itself, can be of three types:

  1. Attacks that use ICMP "hard" error messages
  2. Attacks that use ICMP "fragmentation needed and Don't Fragment (DF) bit set" messages, also known as Path Maximum Transmission Unit Discovery (PMTUD) attacks
  3. Attacks that use ICMP "source quench" messages

  Successful attacks may cause connection resets or reduction of throughput in existing connections, depending on the attack type.

  Multiple Cisco products are affected by the attacks described in this Internet draft.

  Cisco has made free software available to address these vulnerabilities. In some cases there are workarounds available to mitigate the effects of the vulnerability.

  This advisory is posted at http://www.cisco.com/warp/public/707/cisco-sa-20050412-icmp.shtml.

  The disclosure of these vulnerabilities is being coordinated by the National Infrastructure Security Coordination Centre (NISCC), based in the United Kingdom. NISCC is working with multiple vendors whose products are potentially affected. Its posting can be found at: http://www.niscc.gov.uk/niscc/docs/re-20050412-00303.pdf?lang=en.

- CSCef6059

  A document that describes how the Internet Control Message Protocol (ICMP) could be used to perform a number of Denial of Service (DoS) attacks against the Transmission Control Protocol (TCP) has been made publicly available. This document has been published through the Internet Engineering Task Force (IETF) Internet Draft process, and is entitled "ICMP Attacks Against TCP" (draft-gont-tcpm-icmp-attacks-03.txt).

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Related Documentation

Platform-Specific Documents

For a list of documents for the Cisco Catalyst 4500 series switch, refer to the *Release Notes for the Catalyst 4500 Switch, Cisco IOS Release 12.1(20)EW* on Cisco.com at this URL:

http://www.cisco.com/univercd/cc/td/doc/product/lan/cat4000/relnotes/ol_2170.htm

Hardware Documents

For instructions for installing the Cisco uMG9850 QAM Module in a Cisco Catalyst 4500 series switch, refer to *Quick Start Guide—Installing the Cisco uMG9850 QAM Module* on Cisco.com at this URL:

http://www.cisco.com/univercd/cc/td/doc/product/cable/vod/umg9850/index.htm

Software Documents

For configuration information specific to the uMG9850 QAM Module, refer to *Configuring the Cisco uMG9850 QAM Module* on Cisco.com at this URL:

http://www.cisco.com/univercd/cc/td/doc/product/cable/vod/umg9850/index.htm

Cisco IOS Software Documentation Set

For a list of Cisco IOS software documents, refer *Release Notes for the Catalyst 4500 Switch, Cisco IOS Release 12.1(20)EW* on Cisco.com at this URL:

http://www.cisco.com/univercd/cc/td/doc/product/lan/cat4000/relnotes/ol_2170.htm

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

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You can find instructions for ordering documentation at this URL:

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

You can order Cisco documentation in these ways:

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  http://www.cisco.com/en/US/partner/ordering/index.shtml

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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

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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

This document is to be used in conjunction with the documents listed in the "Related Documentation" section.