Solutions	Products	Ordering	Support	Partners	Training	Corporate

White Papers

White Paper: Cisco IOS Reference Guide

Understanding the Cisco IOS® Software releases is essential to the design, deployment, and management of Cisco networks. In order to select and deploy the most appropriate Cisco IOS Software release for their networks, customers should be familiar with the portfolio of available releases. Read this white paper to get a basic understanding of Cisco IOS Software releases. Refer to the Cisco IOS Software Technical Documentation for detailed information about how to install and configure Cisco IOS Software.

Contents

Introduction

Cisco IOS Software is the premier network infrastructure software and delivers seamless integration of technology innovation, business-critical services and hardware support. Currently operating on millions of active systems, from small home office routers to the core systems of the largest service provider networks in the world, Cisco IOS Software is the most widely deployed network operating software in the world.

Optimized for today's IP-based networks and offering fast convergence, Cisco IOS Software provides extraordinary resiliency and advanced networking services by separating control, forwarding, and management planes to yield innovative services and high performance. Extremely flexible, adaptable, and scalable, Cisco IOS Software can run on both high-end distributed hardware and low-end single processor systems. It employs hardware switching using advanced network processors, application-specific integrated circuits, and fast-access memory (content addressable memory) where the stored data item is located by the contents of the memory itself.

Cisco IOS Software minimizes operational expenses, maximizes return on investment, and improves business productivity:

- **Minimizes new infrastructure** The continuous expansion of features and functionality enables you to adapt to evolving business needs.

- **Increases organizational productivity** Reliably delivers access to business-critical applications regardless of time or location.

- **Protects the network from accidental and malicious events** Minimizes intervention and operational support costs.

Cisco IOS Software Family

Cisco IOS Software continues to evolve over time to meet the rapidly changing requirements of the most demanding Enterprise and Service Provider networks. As a family of releases, the feature richness and broad hardware support delivered in Cisco IOS Software is unmatched in the industry.

Table 1 summarizes the latest releases that make up the Cisco IOS Software Family:

Table 1 Cisco IOS Software Family Types and Releases

Type	Release	Description

IOS T	Maintenance Release 12.3 Maintenance Release 12.4	A comprehensive portfolio of Cisco IOS Software technologies and broad hardware adoption for Enterprise, Access, and Commercial networks. Incorporates new software features and hardware introduced in the earlier T release, and additional software fixes. Maintenance releases inherit new Cisco IOS Software functionality and hardware from T releases. This is typically new functionality. Hardware is not introduced in maintenance releases.
	Release 12.4T	Cisco IOS Software functionality and hardware advances for Security, Voice, and Wireless for Enterprise, Access, and Commercial networks.
IOS S	Release 12.2SB	Cisco IOS Software functionality and hardware for Broadband and Leased-Line Aggregation, and MPLS Provider Edge (PE) on a comprehensive portfolio of mid-range routers for Service Provider edge networks.
	Release 12.2SX	Cisco IOS Software functionality and hardware for high-end Ethernet LAN switching for Enterprise access, distribution, Core and data center networks.

	Release 12.2SE Release 12.2SG	Cisco IOS Software functionality and hardware for mid-range and low-end Ethernet LAN switching for Enterprise access and distribution networks, and mid-range and low-end Metro Ethernet for Service Provider edge networks.
	Release 12.2SR	Cisco IOS Software functionality and hardware for high-end Metro Ethernet and MPLS PE for Service Provider edge networks.
IOS XR	Release 3.2	Cisco IOS XR Software functionality and hardware for the Cisco CRS-1 Carrier Routing System and Cisco XR 12000 Series Routers for Service Provider Core networks. Designed to address the terabit scaling, secure virtualization, high availability, and distributed processing requirements of large IP next-generation networks.

Cisco IOS Software Family Hardware

Table 2 correlates Cisco hardware to the recommended Cisco IOS Software Family release.

Table 2 Cisco IOS Software Family Hardware

Hardware	Recommended IOS T, IOS S, IOS XR
Access and Dial Routers	
Cisco 800, 1700, 2600, 2800 Series Routers	12.4 12.4T

| Cisco 3700 and 3800 Series Routers	12.4 12.4T
Cisco AS5x50	12.4 12.4T
Switches	
Cisco Catalyst 2970, 3560 and 3750 Series	12.2SE
Cisco Catalyst 4500 and 4900 Series Switch	12.2SG
Cisco Catalyst 6500 Series Switch	12.2SX
Mid-Range Hardware	
Cisco 7200 Series and Cisco 7301 Routers	12.4 12.4T 12.2SB
Cisco 7304 Router	12.2SB
Cisco 7500 Series Router	12.4 12.0S
Cisco 10000 Series Router	12.2SB
High-End Hardware	
Cisco 7600 Series Internet Router	12.2SR
Cisco 8550 MGX RPM-PR/XF Router	12.4T
Cisco 12000 Series Router	IOS-XR, 12.0S
Cisco CRS-1 Carrier Routing System	IOS-XR

Cisco IOS Software Family Numbering

In order to effectively manage Cisco IOS Software releases within your network, it is important to understand IOS T, IOS S, and IOS XR numbering.

IOS T Numbering

Figure 1 illustrates the relationships between Cisco IOS Software Maintenance Release 12.4 and Cisco IOS Software Release 12.4T and shows the evolution to Cisco IOS Software Maintenance Release 12.5 and Cisco IOS Software Release 12.5T.

Figure 1 IOS T Relationships
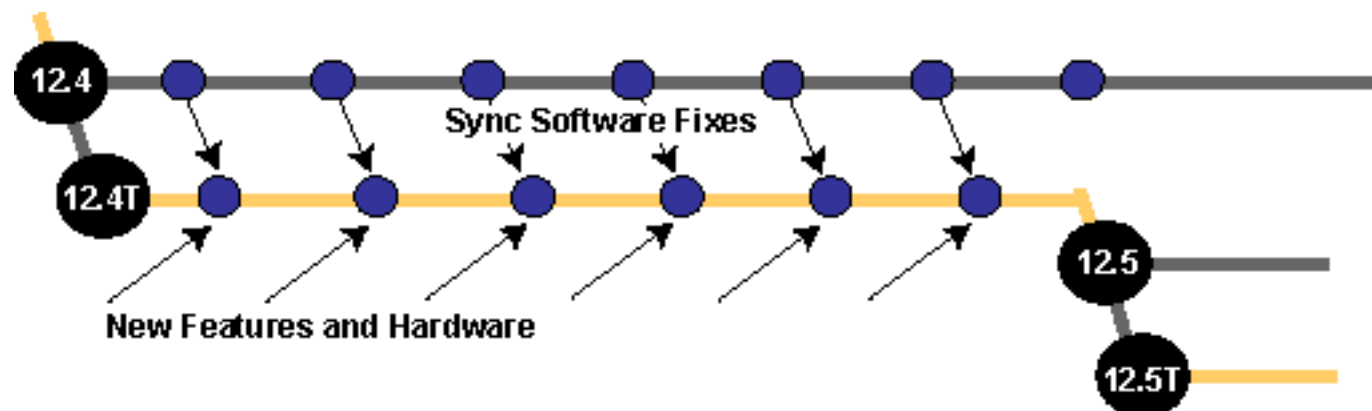
Cisco IOS Software Maintenance Release 12.4 receives software fixes on a regular basis but does not receive new software features or hardware. It is important to note that the fixes applied to Cisco IOS Software Release 12.4 are synchronized with subsequent versions of Cisco IOS Software Release 12.4T. Derived from Cisco IOS Software Release 12.4, Cisco IOS Software Release 12.4T receives regular software fixes and provides new features and hardware. This relationship is carried forward with Cisco IOS Software Releases 12.5 and 12.5T. The software fixes and new software features and hardware support in Cisco IOS Software Releases 12.4 and 12.4T are consolidated in Cisco IOS Software Release 12.5. Additional new software features and hardware are provided in Cisco IOS Software Release 12.5T. The key elements of IOS T numbering are the maintenance release number, individual release number, and the numbered version identifier. (See Figure 2.)

Figure 2 IOS T Numbering

12.4

12.4(7)

12.4(7a)

Maintenance Release Number
Individual Release Number
Numbered Version Identifier

12.4T

12.4(9)T

12.4(9)T1

Maintenance Release Number
Individual Release Number
New Feature Release Identifier
Numbered Version Identifier
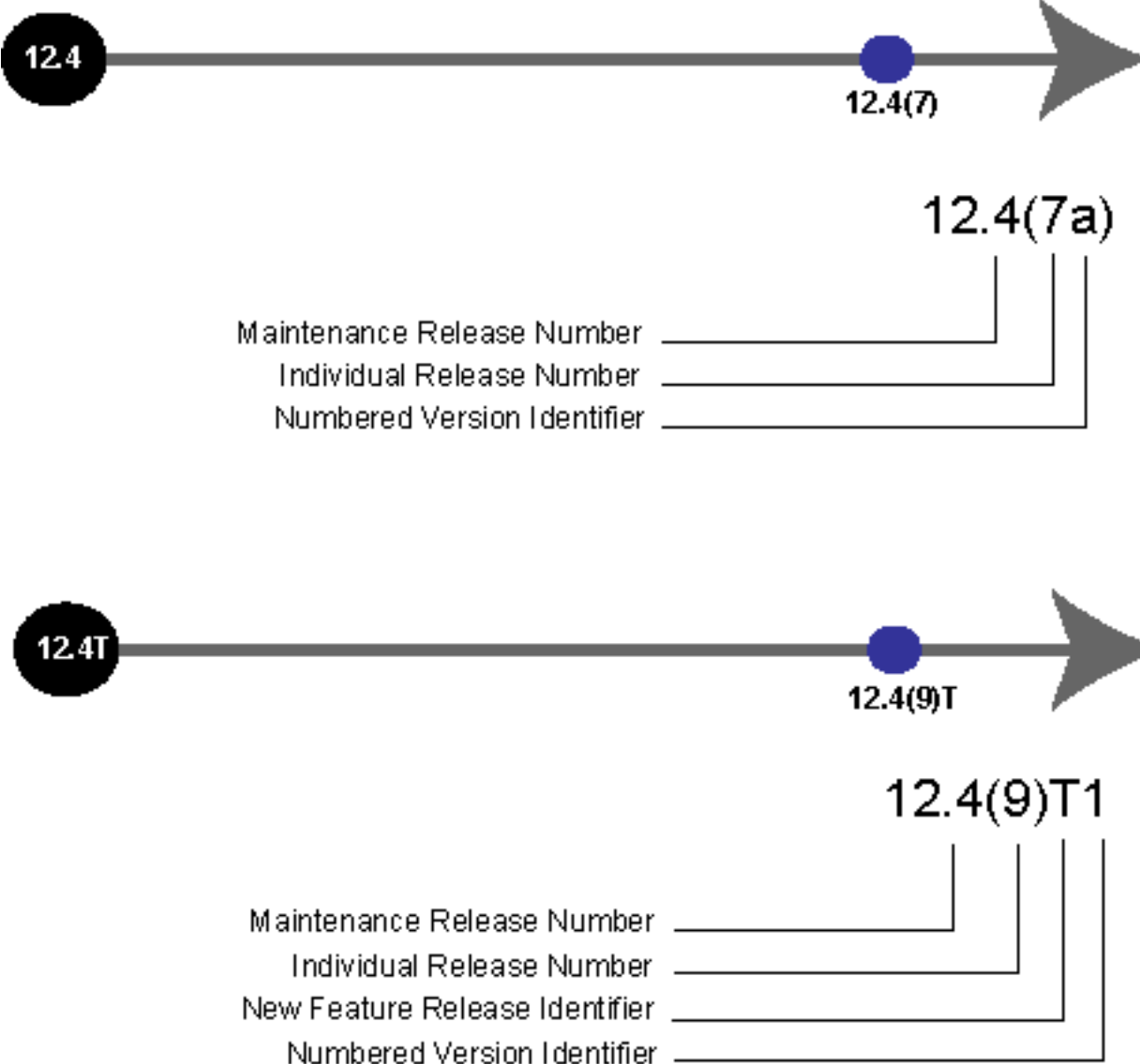
Notes:

- The maintenance release number is the unique number of the release.

- The individual release number is the version identifier of the release. Each individual release of Cisco IOS Software Maintenance Release 12.4 includes additional software fixes. Each individual release of Cisco IOS Software Release 12.4T includes additional software fixes, and new software features and hardware.

- The numbered version identifier is the incremental version of each individual release. Each numbered version delivers additional software fixes on an accelerated schedule, prior to the next planned individual release.

Due to separate schedules, Cisco IOS Software Maintenance Release 12.4 and Cisco IOS Software Release 12.4T do not share individual release numbers. If Cisco IOS Software Release 12.4 and Cisco IOS Software Release 12.4T did share an individual release number, the releases would include the same software fixes.
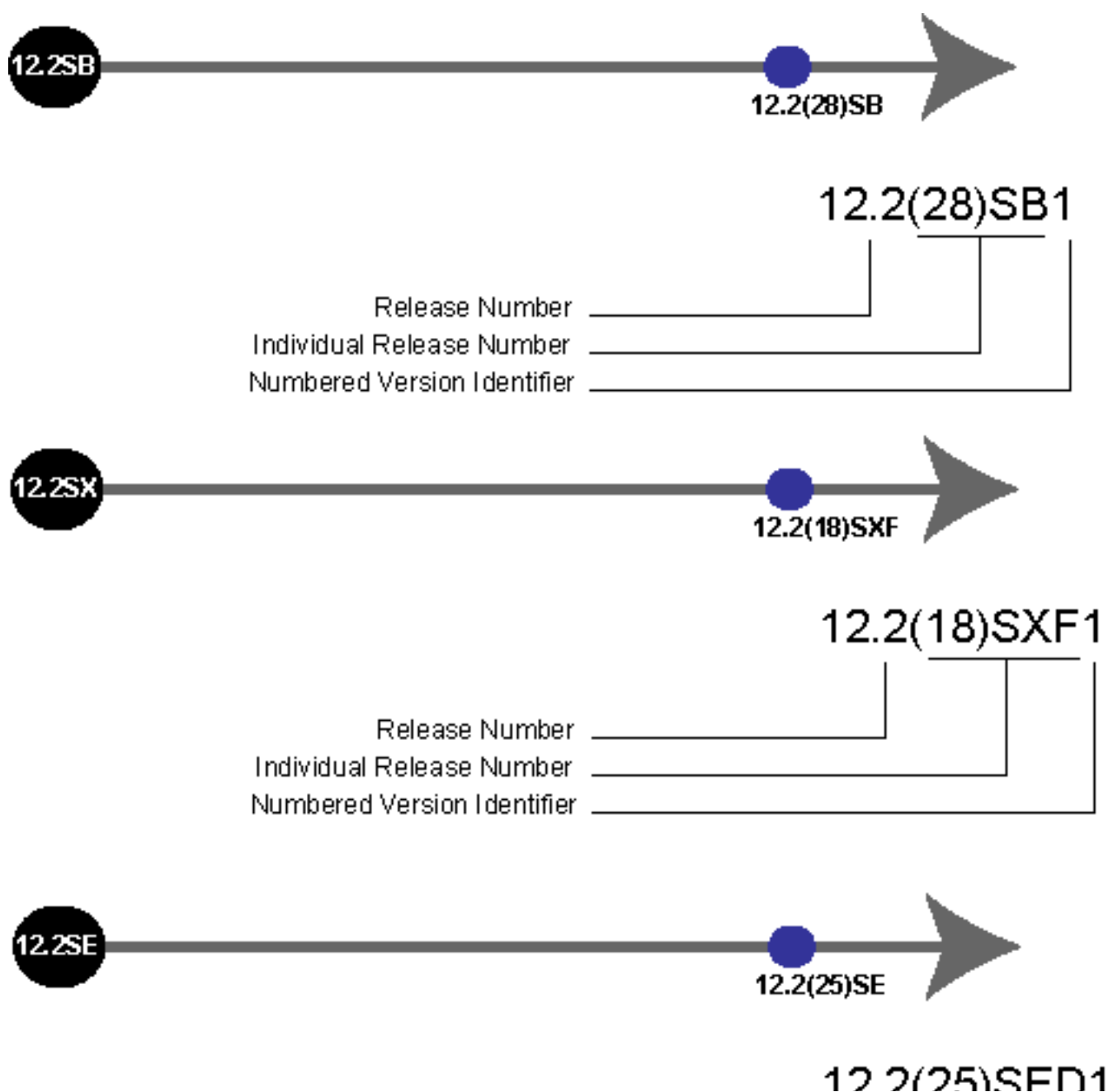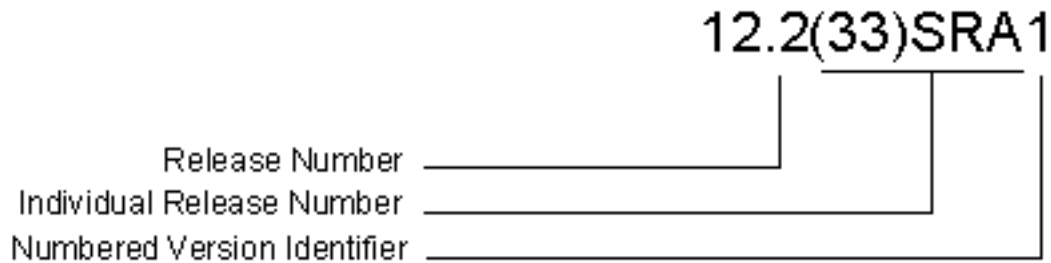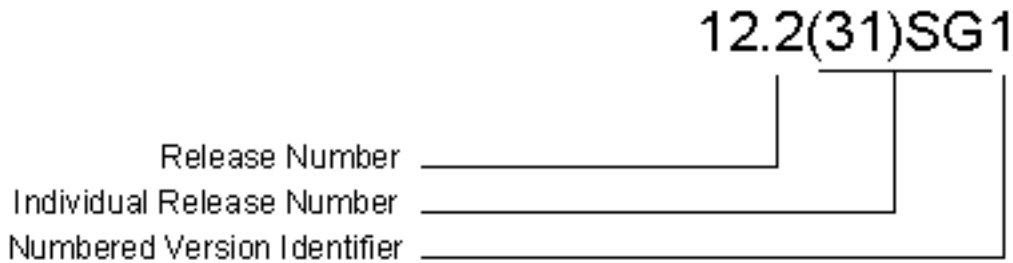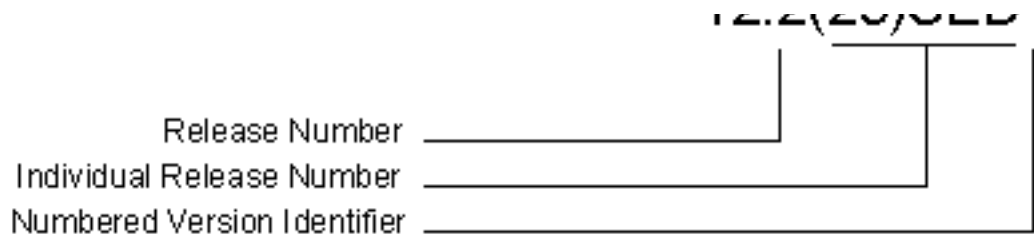
IOS S Numbering

The releases within the IOS S family share a common code base from Cisco IOS Software Release 12.2S. On top of the common code base, additional software fixes and new software features are included in each version of Cisco IOS Software Releases 12.2SB, 12.2SX, 12.2SE, 12.2SG, and 12.2SR. After their inclusion, where applicable, the additional software fixes and new software features are propagated to other IOS S family members.

By sharing the common code base and through the independent delivery of fixes, features, and hardware, Cisco optimizes the IOS S family members to meet the rapidly changing requirements of critical Enterprise and Service Provider market segments.

The key elements of IOS S numbering are the release number, individual release number, and the numbered version identifier. (See Figure 3.)

Figure 3 IOS S Numbering

12.2SB
12.2(28)SB

12.2(28)SB1

Release Number
Individual Release Number
Numbered Version Identifier

12.2SX
12.2(18)SXF

12.2(18)SXF1

Release Number
Individual Release Number
Numbered Version Identifier

12.2SE
12.2(25)SE

12.2(25)SED1

12.2(20)SED1

Release Number

Individual Release Number

Numbered Version Identifier

12.2SG

12.2(31)SG

12.2(31)SG1

Release Number

Individual Release Number

Numbered Version Identifier

12.2SR

12.2(33)SRA

12.2(33)SRA1

Release Number

Individual Release Number

Numbered Version Identifier

IOS XR Numbering

Cisco IOS XR software comprises modular packages. Each package contains the components to perform a specific set of router functions, such as routing, security, or line card support. The key elements of IOS XR numbering are the major release identifier, minor release identifier, and maintenance revision identifier. (See Figure 4.)

Figure 4 IOS XR Numbering
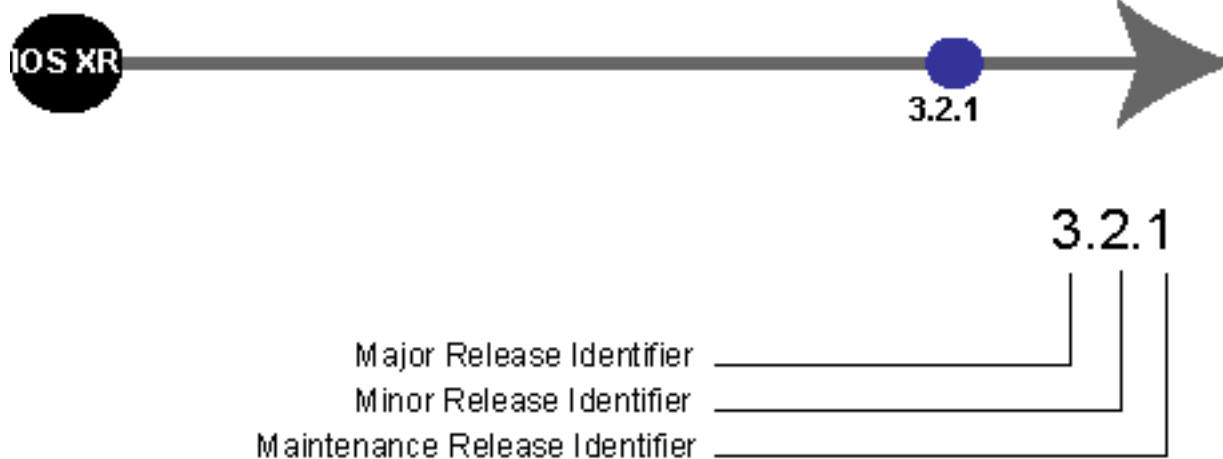
The major release identifier is the major release number for a package. A major release occurs when there is a significant architectural change to the product (for example, an important new capability is introduced). All packages that operate on the router must be at the same major release level. The minor release identifier is the minor release number for a given package. A minor release contains one or more new features or software fixes.

The minor release version does not have to be identical for all software packages that operate on the router. But the operating packages must be certified by Cisco as compatible with each other. The maintenance revision identifier is the maintenance release number for a given package. A maintenance release contains a collection of software fixes.

The maintenance release version does not have to be identical for all software packages that operate on the router. But the major and minor versions of the maintenance release must match those of the package that is updated.

Cisco IOS Software Release Migration

Cisco recommends that customers take inventory of the Cisco IOS Software releases deployed in their networks on a regular basis. This helps to ensure that networks run the most current, supported releases and to keep the total number of deployed releases to a minimum.

In general, the migration path for a Cisco IOS Software release is to the latest version of that release. The latest version incorporates the current software fixes, hardware support, and new software features. For example, upgrade from a maintenance release to a new version of that maintenance release, and upgrade from a T release or an SG release to a new version of the T or SG release, respectively.

In order to support new hardware or functionality, customers might need to upgrade from a maintenance release to a T release, or to a completely different family. For example, to support the latest features of the Cisco 10000, upgrade from Cisco IOS Software Release 12.0S or 12.3XI to Cisco IOS Software Release 12.3SB, or to support the latest features of the Catalyst 6500, upgrade from Cisco IOS Software Release 12.1E to 12.2SX.

The IOS T Migration Examples section presents high-level examples of migration for some of the currently shipping IOS T, IOS S, and IOS XR releases.

Note: Cisco IOS Software release migration is an ongoing process that takes detailed planning. Customers should work closely with their account managers when they take inventory of their deployed Cisco IOS Software releases and plan migration to the current releases.

IOS T Migration Examples

Table 3 and Table 4 describe example migration paths from Cisco IOS T releases.

Table 3 Migration Paths from Cisco IOS Software Release 12.4(7)

Migration Strategy	Example Strategy
Cisco IOS Software Release 12.4(7x) runs on the network, where x is a numbered version of Cisco IOS Software Release 12.4(7), such as Cisco IOS Software Release 12.4(7a). You need additional software fixes on an accelerated schedule prior to the next individual release which is Cisco IOS Software12.4(8).	Migrate to the next (or later) numbered version of Cisco IOS Software Release 12.4(7), such as Cisco IOS Software Release 12.4(7b).
Cisco IOS Software Release 12.4(7) runs on the network. You need additional software fixes.	Migrate to the next (or later) individual release after Cisco IOS Software Release 12.4(7), such as Cisco IOS Software Release 12.4(8).
Cisco IOS Software Release 12.4(7) runs on the network. You need software fixes, new features, and hardware support delivered in the Cisco IOS Software Release 12.4T family.	Migrate to the next (or later) instance of Cisco IOS Software Release 12.4T. For example, migrate to Cisco IOS Software Release 12.4(9)T.

Cisco IOS Software Release 12.4(7) runs on the network. You need additional software fixes, new features, and hardware support delivered in the Cisco IOS Software Release 12.4T family, and you want to continue running a maintenance release.	Migrate to the next maintenance Cisco IOS Software Release 12.5(x), where x is the next (or later) instance of Cisco IOS Software Release 12.5. For example, migrate from Cisco IOS Software Release 12.4(7) to 12.5(1).
Cisco IOS Software Release 12.4(7) runs on the network. You need additional software fixes, new features, and hardware support in addition to what was delivered in Cisco IOS Software Release 12.4T. You do not need to run a maintenance release.	Migrate to Cisco IOS Software Release 12.5(x)T, where x is the next (or later) instance of Cisco IOS Software Release 12.5T. For example, migrate from Cisco IOS Software Release 12.4(7) to 12.5(2)T.

Table 4 Migration Paths from Cisco IOS Software Release 12.4(9)T

Migration Strategy	Example Strategy
Cisco IOS Software Release 12.4(9)T runs on the network. You need the latest software fixes, new features, and hardware support.	Migrate to Cisco IOS Software Release 12.4(x)T, where x is the next (or later) instance of Cisco IOS Software Release 12.4T after Cisco IOS Software Release 12.4(9)T. For example, migrate from Cisco IOS Software Release 12.4(9)T to 12.4(11)T.
Cisco IOS Software Release 12.4(9)T runs on the network. You need additional software fixes, new features, and hardware support delivered in the Cisco IOS Software Release 12.4T family of releases.	Migrate to the next (or later) maintenance Cisco IOS Software Release 12.5(x), where x is the next instance of maintenance Cisco IOS Software Release 12.5. For example, migrate from Cisco IOS Software Release 12.4(9)T to 12.5(1).

Cisco IOS Software Release 12.4(9)T runs on the network. You need additional software fixes, new features, and hardware support.	Migrate to the next (or later) release of Cisco IOS Software 12.5(x)T, where x is the next instance of Cisco IOS Software Release 12.5T. For example, migrate from Cisco IOS Software Release 12.4(9)T to 12.5(2)T).

IOS S Migration Examples

Table 5 Migration Paths from Cisco IOS Software Release 12.2(28)SB

Migration Strategy	Example Strategy
Cisco IOS Software Release 12.2(28)SB runs on the network. You need the latest software fixes.	Migrate to Cisco IOS Software Release 12.2(28)SBx, where x is the next (or later) numbered version of Cisco IOS Software Release 12.2(28)SB. For example, migrate from Cisco IOS Software 12.2(28)SB to 12.2(28)SB1.
Cisco IOS Software Release 12.2(28)SB runs on the network. You need the latest software fixes, new features, and hardware support.	Migrate to Cisco IOS Software Release 12.2(x)SB or later, where x is the next individual release of Cisco IOS Software Release 12.2SB.

Table 6 Migration Paths from Cisco IOS Software Release 12.2(18)SXF

Migration Strategy	Example Strategy
Cisco IOS Software Release 12.2(18)SXF runs on the network. You need the latest software fixes.	Migrate to Cisco IOS Software Release 12.2(18)SXFx, where x is the next (or later) numbered version of Cisco IOS Software Release 12.2(18)SXF. For example, migrate from Cisco IOS Software Release 12.2(18)SXF to 12.2(18)SXF1.

Cisco IOS Software Release 12.2(18)SXF runs on the network. You need the latest software fixes, new features, and hardware support.	Migrate to Cisco IOS Software Release 12.2(x)SXx, where x is the next individual release of Cisco IOS Software Release 12.2SX. For example, migrate from Cisco IOS Software Release 12.2(18)SXF to 12.2(30)SXG.

IOS XR Migration Examples

Table 7 Migration Paths from Cisco IOS XR Releases

Migration Strategy	Example Strategy
Cisco IOS XR Release 3.2.1 runs on the network. You need the latest software fixes.	Migrate to Cisco IOS XR Release 3.2.x, where x is the next (or later) maintenance revision of Cisco IOS XR Release 3.2.1. For example, migrate from Cisco IOS XR Release 3.2.1 to 3.2.2.
Cisco IOS XR Release 3.2.1 runs on the network. You need one or more new features or software fixes.	Migrate to Cisco IOS XR Release 3.x.1, where x is the next minor release of Cisco IOS XR Release 3. For example, migrate from Cisco IOS XR Release 3.2.1 to 3.3.1.
Cisco IOS XR Release 3.2.1 runs on the network. You need major new capabilities.	Migrate to the next major Cisco IOS XR release. For example, migrate from Cisco IOS XR Release 3.2.1 to Release 4.1.1.

Cisco IOS Software Life Cycle

The Cisco IOS Software Release Policy is a structured plan that addresses the Cisco IOS Software life cycle from First Commercial Shipment (FCS) through End of Life (EoL). The Release Policy addresses life cycle guidelines and migration planning for IOS T and IOS S releases, such as Cisco IOS Software Release 12.4 and 12.4T, and Cisco IOS Software Release 12.2SG, as well as Cisco IOS Software Release 12.0S.

These acronyms are associated with life cycle milestones:

- **FCS** First Customer Shipment.

  Cisco makes the release available to customers on Cisco.com.

- **EoS** End of Sale

  Customers can no longer order a release from Cisco manufacturing, but maintenance releases are available to download from the Software Center. An announcement six months prior to EoS provides advanced notice of the milestone.

- **EoE** End of Engineering

  Cisco no longer builds Cisco IOS Software images, no new software fixes are provided by Cisco IOS Engineering, and no new functionality is added. Cisco Technical Support continues to offer customer support for the release.

- **EoL** End of Life

  Cisco Technical Support ends customer support for the release and only opens a case to recommend an upgrade to a newer Cisco IOS Software release.

Refer to Cisco IOS Software Product Life Cycle Dates & Milestones, Product Bulletin No. 2214 for more information.

Figure 5 shows Cisco IOS Software life cycle time frames from FCS to EoL.

Figure 5 Cisco IOS Software Life Cycle Time Frames IOS T and IOS S, and Release 12.0S
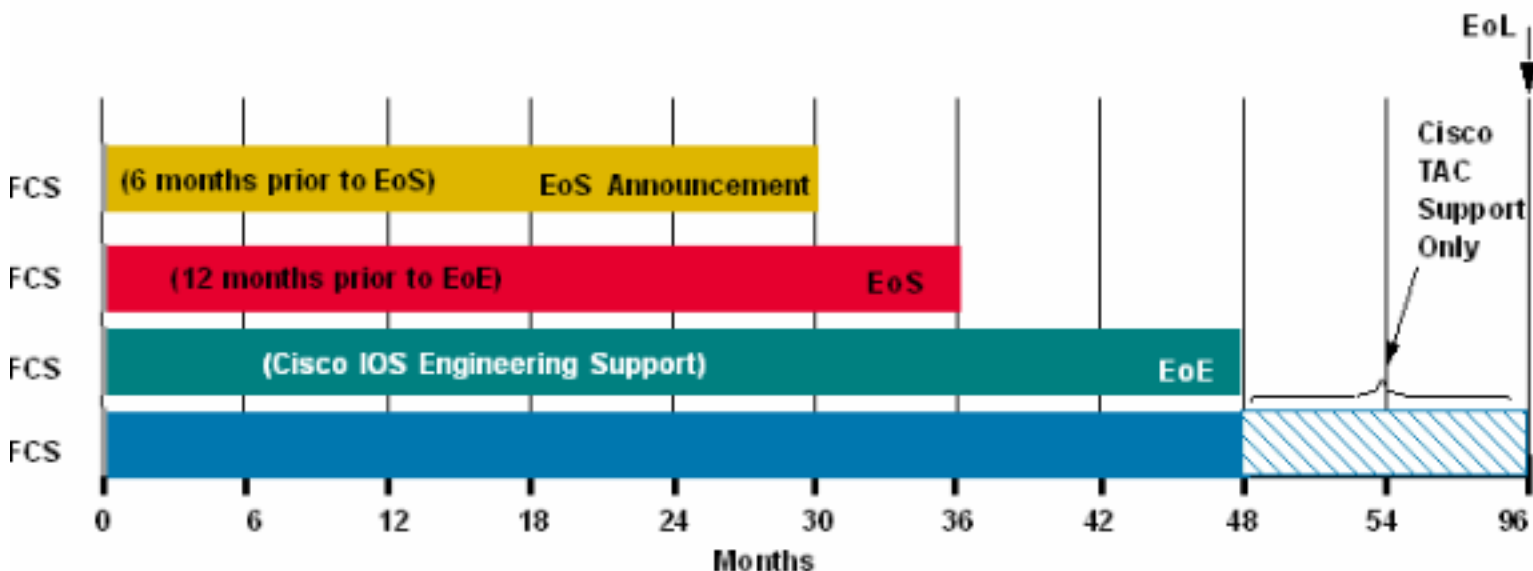
Notes:

- The End of Engineering (EoE) schedule is up to 48 months from FCS.

- The End of Sales (EoS) and EoL milestones are based on EoE time frames.

- Cisco recommends that release review and migration planning start at 36 months.

Software Retirement

Cisco IOS Software placed on the Cisco IOS Software Center remains available for customer download for eighteen months. After eighteen months, the software is eligible for retirement and removal from the Cisco IOS Software Center. The software retirement policy applies to numbered versions of IOS T and IOS S releases, such as Cisco IOS Software Release 12.4(7a), 12.4(8)T1, 12.2(31)SG1), and Cisco IOS Software Release 12.0S.

Software on the Cisco IOS Software Center is not retired unless a viable migration path exists. A viable migration path does not cross critical memory boundaries for supported hardware and, if applicable, has a similar internal or external certification. Cisco IOS Software is subject to deferral at any time should a widespread, catastrophic software defect be discovered.

Software retirement is not a formal life cycle milestone, but it does underscore the recommendation from Cisco that you implement current versions of Cisco IOS Software. Cisco does not recommend new deployments of retired software.

Cisco IOS Software is retired based on age. If the Cisco IOS Software that runs in a customer network is retired, it does not mean the software should be automatically replaced. If the software meets customer needs, then the customer should continue to use it. Cisco supports retired software until it reaches End of Life.

Regardless of its status on the IOS Software Center, Cisco recommends that you maintain copies of all Cisco IOS Software in the network.

Important Communications about Cisco IOS Software Releases

Cisco issues many software advisories to customers for informational purposes only. Often, software advisories describe problems with Cisco IOS Software that are hardware-specific or occur under unusual circumstances, and therefore do not affect most customers. Often, no action is required by the customer.

These critical software release communications from Cisco do require customers to evaluate the impact of the underlying problem on their networks and take appropriate action:

- **Security Advisory** Product Security Incident Response Team (PSIRT) issues a security advisory to alert customers to security issues that directly impact Cisco products and to help customers repair the Cisco product.

- **Security Notices** Cisco issues Security Notices about issues that require a response to information posted to a public forum, or to make recommendations to mitigate general problems that affect network stability.

- **Deferral Advisory** Cisco issues a deferral advisory to announce the removal of a Cisco IOS image from Cisco's offerings and to introduce a replacement image. A Deferral Advisory is most often issued to correct a critical defect. At the time that the deferral of a Cisco IOS image is advised, customers are strongly urged to migrate from the affected image to the replacement image.

Cisco IOS Packaging

Cisco IOS Packaging consists of eight packages for Cisco routers and five packages for Cisco switches. (See Figure 6.)

Figure 6 Cisco IOS Packaging for Cisco Routers and Switches
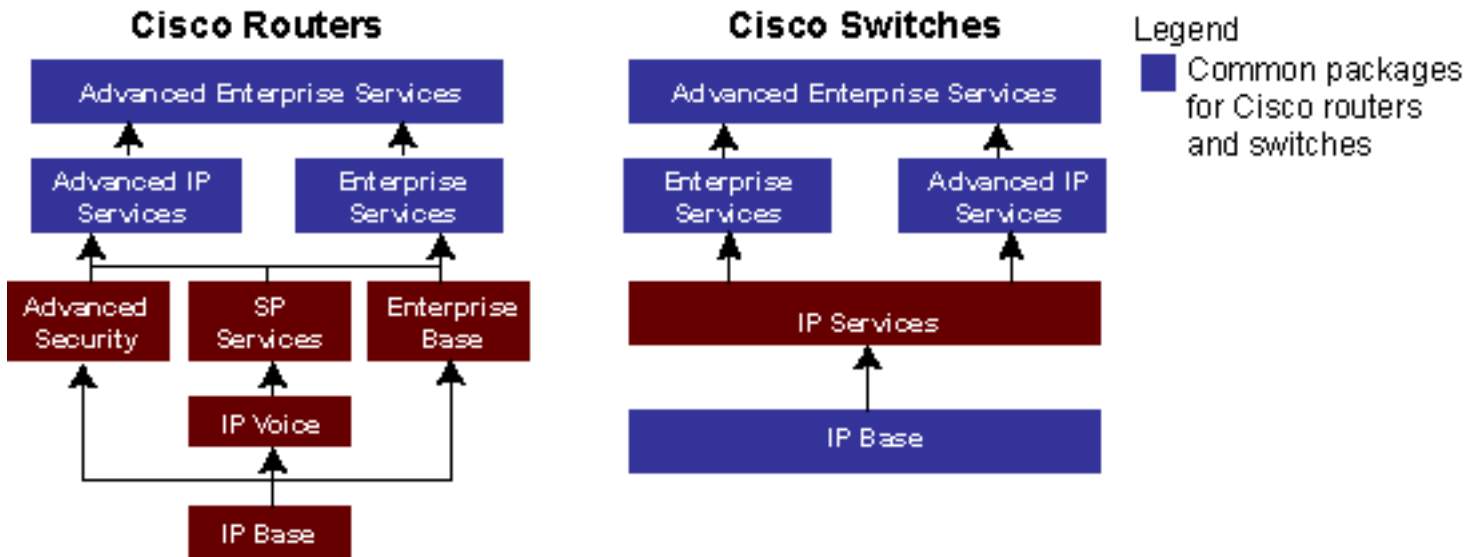
Four packages are designed to satisfy requirements in four typical service categories:

- IP data

- Converged voice and data

- Security and VPN

- Enterprise protocols

Three additional premium packages offer new Cisco IOS Software feature combinations that address more complex network requirements. All features merge in the Advanced Enterprise Services package that integrates support for all routing protocols with Voice, Security, and VPN capabilities.

Feature inheritance is another powerful aspect of Cisco IOS Packaging. After a feature is introduced, it is included in the more comprehensive packages. The feature inheritance facilitates migration by clarifying the feature content of the different packages and how they relate to each another.

Cisco IOS Packaging also simplifies image naming. Each name is designed to effectively convey the high-level feature content of, and the inheritance characteristics for the new packages.

These categories summarize the new naming convention:

- **Base** entry level image (IP Base, Enterprise Base)

- **Services** addition of IP Telephony Service, MPLS, Voice over IP (VoIP), Voice over Frame Relay (VoFR), and ATM (SP Services, Enterprise Services)

- **Advanced** addition of VPN, Cisco IOS Firewall, 3DES encryption, SSH, Cisco IOS IPsec and Intrusion Detection Systems (IDS) (Advanced Security, Advanced IP Services)

- **Enterprise** addition of multi-protocols, including IBM, IPX, AppleTalk (Enterprise Base, Enterprise Services)

These packages are new:

- IP Base

- IP Voice

- Enterprise Base

- Advanced Security

- SP Services

- Advanced IP Services

- Enterprise Services

- Advanced Enterprise Services

Cisco IOS Packaging was introduced on Cisco access routers in May 2003, Cisco LAN switches in April 2005, and Cisco mid-range routers in July 2005. Refer to the Cisco IOS Packaging page for additional information about Cisco IOS Packaging.

Cisco IOS XR Packaging

The IOS XR equivalent of feature sets is called packages. Each package contains many features. Go to the Cisco IOS XR Software Selector (registered customers only) to determine the feature content of each package.
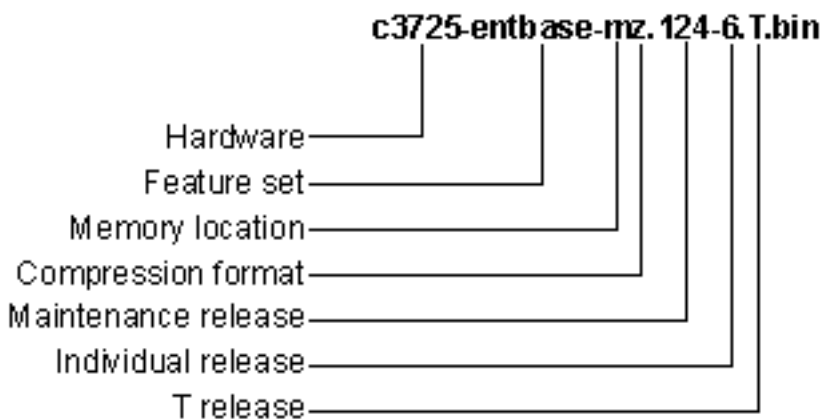
Cisco IOS and IOS XR Images

A Cisco IOS image is a binary executable file of a feature set for specific hardware. A Cisco IOS XR image is a tar or pie file, which contains a package or set of packages, respectively. Multiple images exist for Cisco IOS and Cisco IOS XR releases. The images represent supported hardware and feature set (IOS) or package (IOS XR) combinations.

Image Naming

The Cisco IOS software image name represents the hardware, feature set, format, and other information about the image file. Figure 7 shows the image name of a 12.4(6)T Release with the Enterprise Base feature set for the Cisco 3725.

Figure 7 Example of a Cisco IOS Image Name

c3725-entbase-mz.124-6.T.bin

Hardware
Feature set
Memory location
Compression format
Maintenance release
Individual release
T release

Refer to the Image Naming Conventions section of Loading and Maintaining System Images for information about identifying the platform or board for which the binary software is built, the package feature content of the image, and the area of memory used by the image at run time.

Figure 8 shows the image name of an IOS XR Release 3.2.4 with the IP/MPLS Core Software 3DES package for the CRS-1.

Figure 8 Example of a Cisco IOS XR Image Name (TAR)

CRS-1-iosxr-k9.3.2.4.tar

Hardware
Software Type
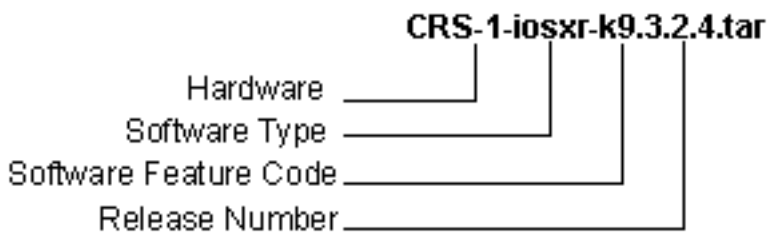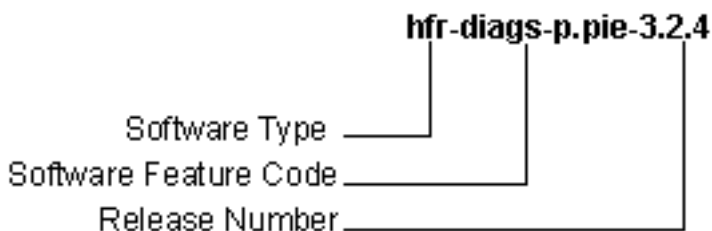Software Feature Code
Release Number

Figure 9 shows the image name of an IOS XR Release 3.2.4 with the Cisco IOS/XR Diagnostics package for the CRS-1. The acronym hfr was an early name for the IOS XR.

Figure 9 Example of a Cisco IOS XR Image Name (PIE)

hfr-diags-p.pie-3.2.4

Software Type
Software Feature Code
Release Number

Images That Run on a Router

The **show version** command displays the name of the Cisco IOS image (see Figure 10) or a Cisco IOS XR image (see Figure 11) that is running.

Figure 10 Cisco IOS Software Release 12.4(6)T Output from the show version Command

```
FrameSwitch>show version
Cisco Internetwork Operating System Software
IOS (tm) 3525 Software (C3525), Version 12.4(6)T, RELEASE SOFTWARE (fc1)
TAC Support: http://www.cisco.com/tac
Copyright (c) 1986-2006 by cisco Systems, Inc.
Compiled Thu 27-Apr-06 19:47 by ccai
Image text-base: 0x600089C0, data-base: 0x6195C000

ROM: System Bootstrap, Version 11.1(13)CA, EARLY DEPLOYMENT RELEASE
SOFTWARE (f)

FrameSwitch uptime is 1 week, 2 days, 5 hours, 27 minutes
System returned to ROM by power-on
System image file is "slot0:c3725-entbase-mz.124-6.T.bin"
```

← show version command

← image file name

Figure 11 Cisco IOS XR 3.2.4 Output from the show version Command

```
RP/0/RP0/CPU0:router# show version
Cisco IOS-XR Software, Version 3.2.4
Copyright (c) 2006 by cisco Systems, Inc.

ROM: System Bootstrap, Version 1.32(20040120:002852) ,

router uptime is 2 days, 1 hour, 59 minutes
System image file is "tftp://223.0.0.0/usr/comp-hfr-diags-p.pie.3.2.4"

cisco CRS-16/S (7450) processor with 2097152K bytes of memory.
7450 processor at 650Mhz, Implementation, Revision

4 Packet over SONET network interface(s)
4 SONET/SDH Port controller(s)
1 Ethernet/IEEE 802.3 interface(s)
2043k bytes of non-volatile configuration memory.
1000592k bytes of ATA PCMCIA card at disk 0 (Sector size 512 bytes).

Configuration register is 0x2
Package active on node 0/2/SP:
hfr-admin, V 1.0.0, Cisco Systems, at mem:hfr-admin-1.0.0
Built on Fri Mar  5 19:12:26 PST 2006
```

← show version command

← image file name

Tools and Resources

Table 8 briefly describes some of the most useful Cisco tools for planning a Cisco IOS release migration.

Table 8: Tools and Resources

Tool	Description

[Bug Toolkit](#) ([registered](#) customers only)	Searches for known bugs based on software version, feature set, and keywords.
[Cisco IOS Software Technical Documents](#)	Documentation for each release of Cisco IOS Software.
[Cisco IOS Upgrade Planner](#) ([registered](#) customers only)	Finds releases by platform, release, and feature set, and downloads images of Cisco IOS Software.
[Feature Navigator](#) ([registered](#) customers only)	Finds releases that support a set of software features and platforms, and compares releases.
[Software Advisor](#) ([registered](#) customers only)	Compares IOS releases, matches IOS and CatOS features to releases, and finds out which software release supports a given hardware device.
[Software Center: Cisco IOS Software](#)	Download releases from this site.
[Software Selector](#) ([registered](#) customers only)	Finds required features for a given technology.

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