White Paper: Cisco IOS® Reference Guide

All you need to know about Cisco IOS software:

- Cisco IOS release process
- Release naming convention
- Software maintenance numbering convention
- Relationship between various Cisco IOS releases

By
Mack M. Coulibaly
Cisco IOS® Serviceability Program Manager
mack@cisco.com

CISCO SYSTEMS

®

Cisco IOS® software enables networking solutions with support for the most comprehensive set of industry-leading features that provide the intelligence of the Internet. Cisco IOS software is a broad and cohesive internetworking operating system that offers a scalable migration path for data, voice, and video with unmatched security, protocols, and network management integrated services. Cisco IOS network services deliver the best breed of functionality around scalable Internetworks that support new, leading-edge Internet applications.

Table of Contents

Cisco IOS Reference Guide by Mack M. Coulibaly   Cisco Systems, Inc.

Glossary of Terms

Cisco Connection Online (CCO)   Cisco's web site: http://www.cisco.com.

Upgrade Planner   The section of CCO through which Cisco IOS software images can be downloaded (http://www.cisco.com/cgi-bin/iosplanner/iosplanner.cgi?).

First Commercial Shipment (FCS)   Date of first shipment to customers through any channel for revenue.

Manufacturing FCS   Date that a software release is made available for shipment through Manufacturing with hardware or media orders for revenue.

Software Image   The monolithic-compiled software binary delivered to customers. Cisco IOS images are specific to hardware platforms. For example, "rsp-pv-mz.120-5.S.bin" is a Cisco IOS 12.0(5)S image for the RSP platforms (RSP7000 and 7500 series routers).

Mainline Branch   The branch used for a particular version of Cisco IOS software. For example, Cisco IOS 12.0 mainline uses the "connecticut" or "conn" branch. This branch is used to integrate fixes and to generate weekly interim build images for development test purposes.

Throttle Branch   The branch pulled from the mainline branch to provide a controlled repository just prior to FCS. Typically, only customer critical fixes are allowed in the throttle branch, usually to fix a catastrophic problem or repair software regression. The throttle branch runs parallel to the mainline branch and any fix applied to the throttle branch is also applied to the mainline branch. The use of a throttle branch allows the mainline to remain open to all bug fixes without impacting the upcoming maintenance release.

Throttle Build   Compiled images on the throttle branch which incorporates "showstopper" or critical fixes into images prior to the final regression testing. Throttle builds are considered interim builds except that the physical build is performed on a separate branch from the mainline branch. As such, images banners for throttle build images look similar to that of interim images and display the "MAINTENANCE INTERIM SOFTWARE" label.

Renumber Build   A build on the throttle branch that occurs after the throttle build and after regression testing is completed on throttle build images. The renumber build is designed to renumber the software image from an interim notation to a maintenance revision notation (for example, from Cisco IOS 12.0(6.6) to 12.0(7)). Renumber builds normally do not contain new bug fixes. The renumber build is the final build on the throttle branch and generates a maintenance revision which is FCSed on CCO and Mfg. Image banners for renumber build images display the "RELEASE SOFTWARE (fc1)" label.

Interim Build	Work-in-process image builds (typically performed weekly) that are built between maintenance releases to integrate the latest round of bug fix commits (for example, 12.0(7.3)). This type of a release is periodically submitted to the Automated Regression Facility (ARF) and the development test teams. ARF will execute a 72 hour regression test run and post a report with any newly found regressions identified. Since only limited testing is applied to interim releases, images from those releases should be delivered with caution to customers. Interims are designed to provide an integrated fix prior to the release of that fix in the next maintenance release. Image banners for interim build images display the "MAINTENANCE INTERIM SOFTWARE" label.
Shadow Build	A build occurring on the mainline branch in the "shadow" of a throttle branch (in parallel with builds on the throttle branch). Shadow builds occur so that fixes committed into the mainline are built and made available for testing weekly. Shadow builds are not intended for customer consumption and are strictly for internal engineering purposes. Image banners from shadow build images display the "CISCO DEVELOPMENT TEST VERSION" label.
Beta Build	An interim build performed prior to the initial FCS of a software release. The images produced are available for internal testing and for customers that are formally signed up (through a non-disclosure agreement signed and received by Cisco) to participate in the beta program for a release. Image banners from shadow build images display the "BETA TEST SOFTWARE" label.
Posting	The act of delivering images to CCO and the release archive (/release).
Deferral	Moving images containing serious customer-impacting defects to a locked directory and removing them from CCO.
Software Rebuild	A second build performed on a throttle branch after the renumber build was completed. This happens when a catastrophic defect that significantly impacts customer usage is found on the renumber build. If the renumber images have already been formally posted to CCO, the release numbering for the rebuild will be augmented to clearly identify the rebuild. For example, Cisco IOS 12.0(2a), 12.0(1)T1, and 12.0(3)DB1 are rebuilds of Cisco IOS 12.0(2), 12.0(1)T, and 12.0(3)DB, respectively.
Engineering Special	A subset of a release built specifically by individual engineers to support a critical customer who has encountered a special critical defect. Engineering specials are built by engineers and supported by that engineering group. Images from engineering specials are not shipped through Manufacturing or posted on CCO. The image banners will clearly identify them as an "EXPERIMENTAL VERSION." The customer should upgrade to a supported release at the earliest availability.
Major Release	The Cisco IOS software release vehicles that transcend internal business units (BUs) and Line of Businesses (LOB) boundaries to provide cross-platform features. The new Cisco IOS release model has two major releases: the mainline release and the consolidated technology release.
Minor Release	A term not commonly used. Refers to the combined group of Specific Technology Early Deployment (STED) releases, Specific Market Early Deployment (SMED) releases and X Releases. Minor releases as opposed to major releases (grouping of mainline and CTED).

Page 4

Cisco IOS Reference Guide by Mack M. Coulibaly   Cisco Systems, Inc.

Consolidated Technology Early Deployment (CTED) Release	A release of software providing new features and cross-platform support from all BUs. CTEDs mature to mainline releases and subsequently stop accepting new functionality.
Specific Technology Early Deployment (STED) Release	A release of software with limited platform support and created for strategic business needs. It provides maintenance revisions until unification back into the next CTED.
Specific Market Early Deployment (SMED) Release	A release of software targeted on a specific market segment and providing maintenance revisions until unification back into the next CTED. SMEDs usually transcend the LOB boundaries and are managed by the Cisco IOS Technology Division.
Short-lived BU Early Deployment (XED) Release	A release of software that enables Cisco IOS and BUs with critical time-to-market commitments to deliver new features and platforms prior to the release of the corresponding maintenance release of the parent technology release. Often referred to as an X release.
Branch Pull	A term used when referring to the creation of a source code repository (or branch) from the contents of another repository (for example, the Cisco IOS 12.0T branch was pulled from 12.0).
Featurette	A small, simple feature with minimal complexity such that risk of introducing new defects is near zero and the software management burden is minimized.
Limited Deployment (LD)	This phase is the time frame between FCS and GD for main releases. Cisco IOS ED releases only live in Limited Deployment phase, as they never attain GD certification.
General Deployment (GD)	Point at which Cisco declares the release stable on all platforms and in all network environments.
Mature Maintenance (MM)	Under normal circumstances, the release would have reached end of engineering (EOE) at this point. However, customer insistence on keeping the release alive is addressed by transitioning into mature maintenance phase. While in this phase, the release will only receive defect repairs for customer-found severity 1 and severity 2 defects. Internally found problems will be applied on a case-by-case basis.
Restricted Maintenance	This is the end of the MM phase. During this phase, release source code is locked to avoid major application of fixes that might adversely affect the quality of the code.
End of Sale (EOS)	Last date for product orderability through Customer Service or Manufacturing. The product will still be available through Field Support Offices (FSO) and CCO.
End of Engineering (EOE)	Last scheduled maintenance revision. Engineering will no longer actively apply any defect repairs to the release, regardless of origin or severity (except for security and Y2K defects). The product will still be available through FSO and CCO.
End of Life (EOL)	Software is no longer supported by Cisco personnel and is removed from CCO.

Early Deployment (ED)   Software releases that provide new features and new platform support in addition to bug fixes. Cisco IOS CTED, STED, SMED, and XED are variations of ED software releases.

Showstopper   Cisco IOS software will not FCS if it contains defects (bugs) marked by Cisco's Customer Advocacy group as showstopper.

Figure G.1: Cisco IOS Software Release Definition
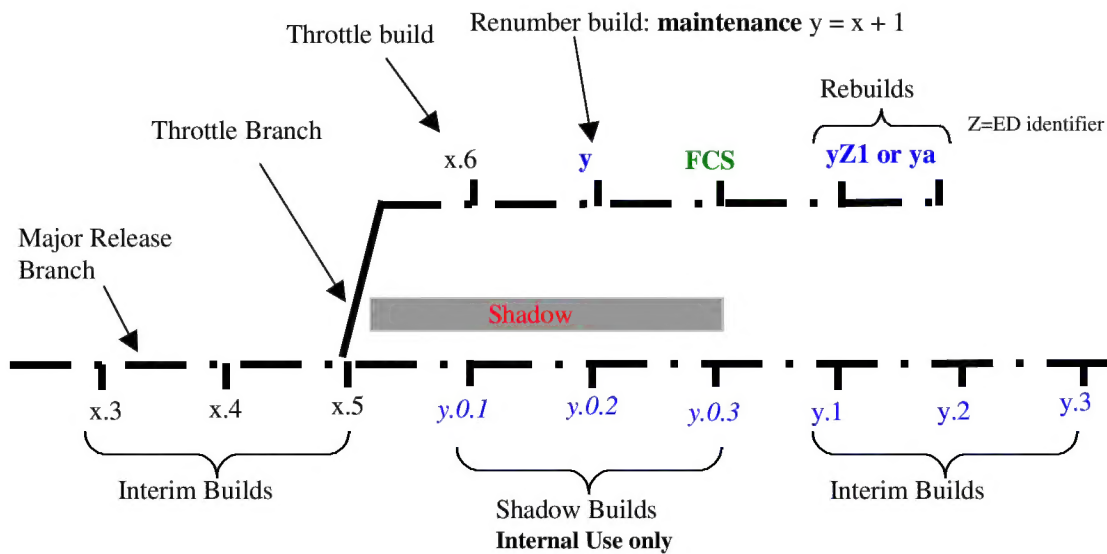
1. Cisco IOS Overview

Cisco IOS software provides network services across the network infrastructure. It optimizes applications and provides an end-to-end solution for globally networked businesses. Cisco IOS software manages resources in a cost-effective manner by controlling and unifying complex distributed network information. It also functions as a flexible vehicle for adding new services and applications to Internet Service Providers (ISPs) and enterprise networks.

1.1. Background

Since its introduction in early 1986, Cisco IOS software has progressively led the industry in innovations. The development of new protocols at Cisco is driven by a commitment to the implementation of industry standards that permit interoperability among disparate systems. Consistent with this commitment, Cisco is a founding member of the AppleTalk Networking Forum, the ATM Forum, and the Frame Relay Forum. Cisco is also an active member of the Open Shortest Path First (OSPF) Forum, the Multiprotocol Label Switching (MPLS) Working group, the Data-link Switching (DLSw) Working Group, the Switched Multimegabit Data Service (SMDS) Interest Group, and many other Internet Engineering Task Force (IETF) working groups. As such, Cisco has participated (and continues to participate) in over 300 Request For Comments (RFCs) and drafts RFCs. Among them are Interior Gateway Routing Protocol (IGRP), Enhanced IGRP (EIGRP), Border Gateway Protocol (BGP), Layer 2 Tunnel Protocol (L2TP), Internet Security Association and Key Management Protocol (ISAKMP), Resource-Reservation Protocol (RSVP), Hot Standby Router Protocol (HSRP), Cisco Discovery Protocol (CDP), Protocol Independent Multicast (PIM), and Tag Switching.

Cisco IOS is one of the most complex and most complete operating systems ever invented. It supports all standardized internetworking protocols in addition to the tens of Cisco proprietary protocols. Cisco IOS also comes fully integrated with applications such as Firewall, Network Address Translation (NAT), Dynamic Host Configuration Protocol (DHCP), File System Manager, Telnet, FTP, HTTP, TFTP, Multimedia Voice Manager, Multimedia Conference Manager, debugging tools, and many more.

In order to accommodate this wealth of innovation, a complex model was derived to serve as a release vehicle for the Cisco IOS software. This white paper is a guide to understanding the Cisco IOS release trains.

1.2 The Foundation of Cisco IOS Release Models

The Cisco Corporation lends its structure to the Cisco IOS release model. Cisco is structured by line of businesses (LOBs) that supports multiple business units (BUs). For example, the Service Provider Line of Business (SPLOB) includes the Network User Business Unit (NUBU), the Multi-Service Access Business Unit (MSABU), and the Network and Service Management Business Unit (NSMBU) among others.

Adjacent to the LOBs and other business functions is the Cisco IOS Technology Division (ITD). Similar to LOBs, ITD includes service units such as the IP Internet Service Unit (IPISU) which develops Cisco's Internet Scaling devices including LocalDirector, DistributedDirector and Cache Engine. IPISU also architects the underlying infrastructure for IP protocols enhancement such as Quality of Service (QoS), Virtual Private Network, IP Multicasting, and other IP scaling services.

The Cisco ITD works closely with every LOB, BU, and functional organization within Cisco to support the company's initiative to deliver new technology to the internetworking marketplace.

1.3 Scope

Figure 1.1 is a sample page of the Cisco IOS Upgrade Planner as it appears on Cisco Connection Online (CCO). On this partial view of the page, there are two dozen types of Cisco IOS software releases. The challenge for any network administrator is to be able to identify the correct Cisco IOS release for its hardware/feature combination. Not only does the Cisco IOS software image need to be appropriate for the design, it must also meet the characteristics of network expansion plans. Throughout this paper, I will provide information to allow the network administrator to identify the content, the life cycle, and the quality/stability level of any Cisco IOS software image.

Figure 1.1: The Cisco IOS Software Upgrade Planner on CCO

1.4. Introduction to Cisco IOS Releases

The two major types of Cisco IOS releases are Main Releases and Early Deployment (ED) Releases:

Cisco IOS Major Releases	Main Release		Referred to as:
	Consolidate Technology Early Deployment (CTED)	Hybrid: Specific Market Early Deployment Releases (SMED)	Technology Releases Early Deployment (ED) Releases
Cisco IOS Minor Releases	Specific Technology Early Deployment (STED)		
	X releases or Short-lived ED (XED)		

Table 1.1: Cisco IOS Release definitions

1.4.1. Cisco IOS Main Releases

Main releases are Cisco IOS releases managed by the Cisco IOS Technology Division and consolidate features, platforms, functionality, technology, and host proliferation from the previous ED releases. Cisco IOS main releases seek greater stability and quality. For that reason, main releases do not accept the addition of features or platforms. Each maintenance revision provides bug fixes only.

The first few maintenance revisions of a Cisco IOS main release are qualified as a Limited Deployments (LDs). Successive revisions provide incremental bug fixes. At some point during the release life cycle, Cisco will declare a main release a General Deployment (GD). GD certification is attained only if certain quality criteria are met. Among the criteria are customer survey of the release, the number of severity 1 and severity 2 defects, and the normalized trend of customer-found defects in the release over the previous four maintenance releases.

A customer advocacy GD certification cross functional team composed of Technical Assistance Center (TAC) engineers, Global Support Engineers (GSEs), and Network Supported Accounts (NSA) engineers, System Test Engineering, and Cisco IOS Engineering is formed to evaluate every outstanding defect of the release. This team gives the final blessing for GD. Once a release attains GD status, every subsequent revision of the release is also GD. Consequently, once a release is declared GD, it automatically enters the restricted maintenance phase. While in this phase, engineering modification of the code, including bug fixes with major code rework, is strictly limited and controlled by a program manager. This ensures that no adverse bug is introduced to a GD-certified Cisco IOS version.
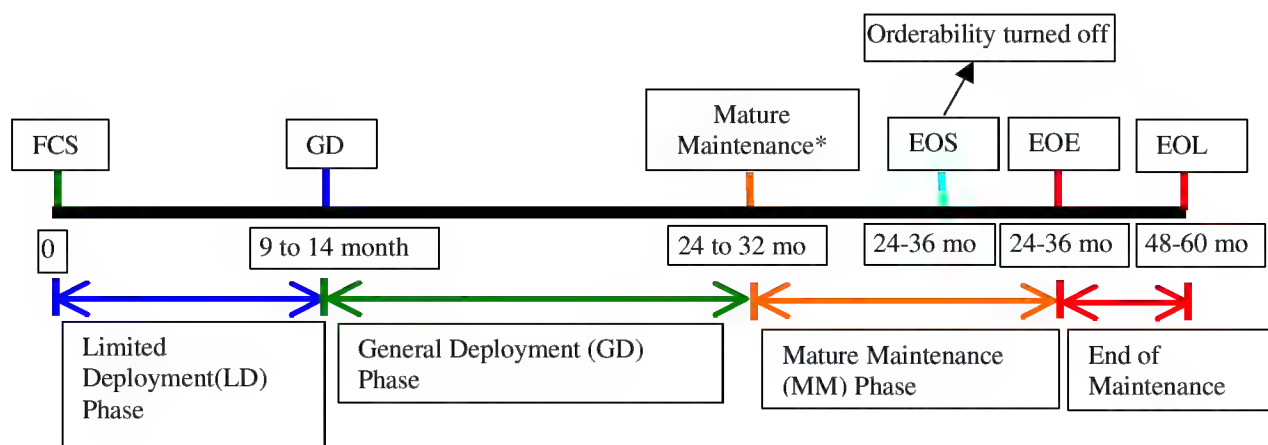
```
FCS = First Customer Ship
GD  = General Deployment
EOS = End of Sale
EOE = End of Engineering
EOL = End of Life
```

Figure 1.2: Cisco IOS Life Cycle Milestones

1.4.2.   Cisco IOS Early Deployment Releases

Unlike main Cisco IOS releases, Cisco IOS ED releases are vehicles that bring new development to the marketplace. Each maintenance revision of an ED release includes not only bug fixes, but also a set of new features, new platform support, and general enhancements to protocols and the Cisco IOS infrastructure. Every one to two years, the features and platforms of the ED releases are ported to the next main Cisco IOS release.

There are four types of ED releases, each with a slightly different release model and life cycle milestones. The ED releases can be classified as:

- Consolidated Technology Early Deployment (CTED) releases
- Specific Technology Early Deployment (STED) releases
- Specific Market Early Deployment (SMED) releases
- Short-lived Early Deployment releases, also known as X Releases (XED)

1.4.3.   Consolidated Technology Early Deployment Releases

The new Cisco IOS release model uses the consolidated ED release train, also known as the "T" train, to introduce new features, new hardware platforms, and other enhancements to Cisco IOS. They are called consolidated technology because they transcend the internal BU and LOB definitions.

Consolidated Cisco IOS release trains, just like Cisco IOS main release trains, provide images for all Cisco hardware. CTED Cisco IOS release trains are easily identifiable by their name, which always ends with a "T" (*technology*). Examples of consolidated technology releases are Cisco IOS 11.3T, 12.0T, and 12.1T.

The technology train, as it is commonly referred to among the "*Ciscovites*," is extremely rich in features and platform support (WIC, Port adapters, interface processors, and software features). If you have Cisco hardware and you've been looking for a Cisco IOS release that supports a certain combination of hardware and features, chances are you'll find them in the latest "T" release. This wealth of features, protocol, and platform support comes with a cost -- stability and reliability. The constant addition of new codes and the perpetual modification of existing codes, adding to the latest twist invented by Cisco or the latest standard approved by the EITF or ITU, renders the technology release substantially less stable than its parent, the main Cisco IOS release train.

Nonetheless, the consolidated technology release train only accepts new functionality for about 12 to 14 months. Thereafter, the code is closed, relabeled, and given a new name that conforms to main release train. At that point, the consolidated release train becomes a main release train and stops accepting new functionality.
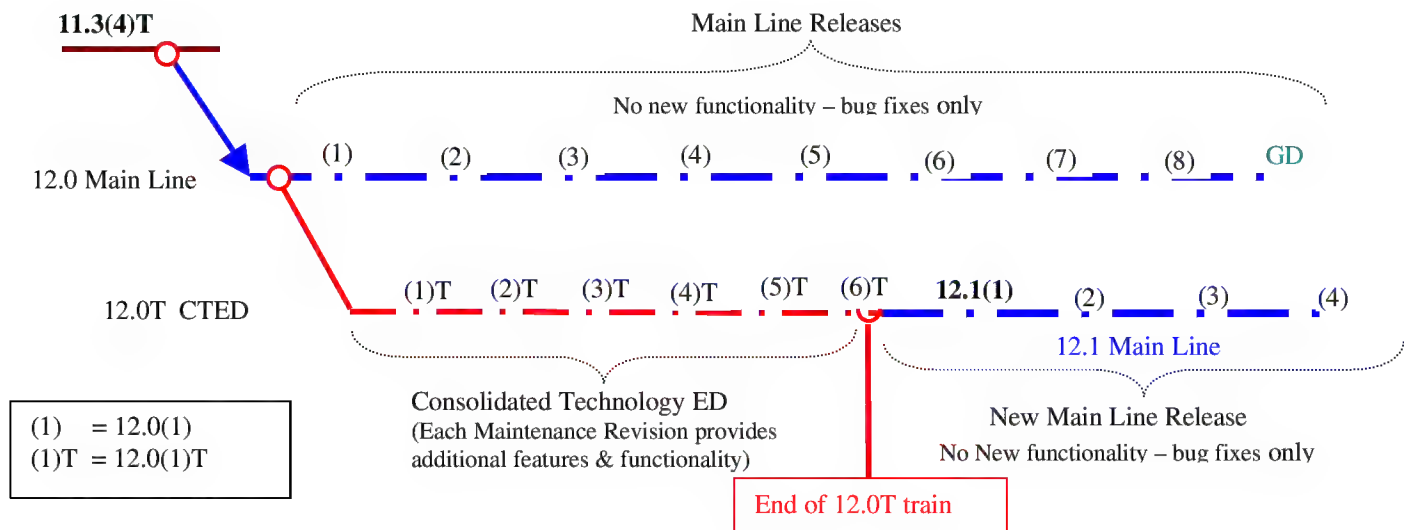
Figure 1.3: CTED – Cisco IOS 12.0T and later

In Figure 1.3, the main release is the previous "T" release and, therefore, has all the features and hardware support that was once part of the preceding "T" train.

1.4.4. CTED Release Train Before Cisco IOS 12.0

Before the Cisco IOS release train 12.0 and family, after a certain milestone, usually four to six maintenance releases (for example, Cisco IOS 11.3(1)T to 11.3(4)T), the "T" train would enter a phase called mature maintenance (MM) phase. Immediately before or after the MM milestone, a copy of the train is made. Usually some infrastructure enhancements are made to the copy of the baseline code, and it is properly relabeled to conform with the main release name structure. The newly relabeled train would become the new main release train.
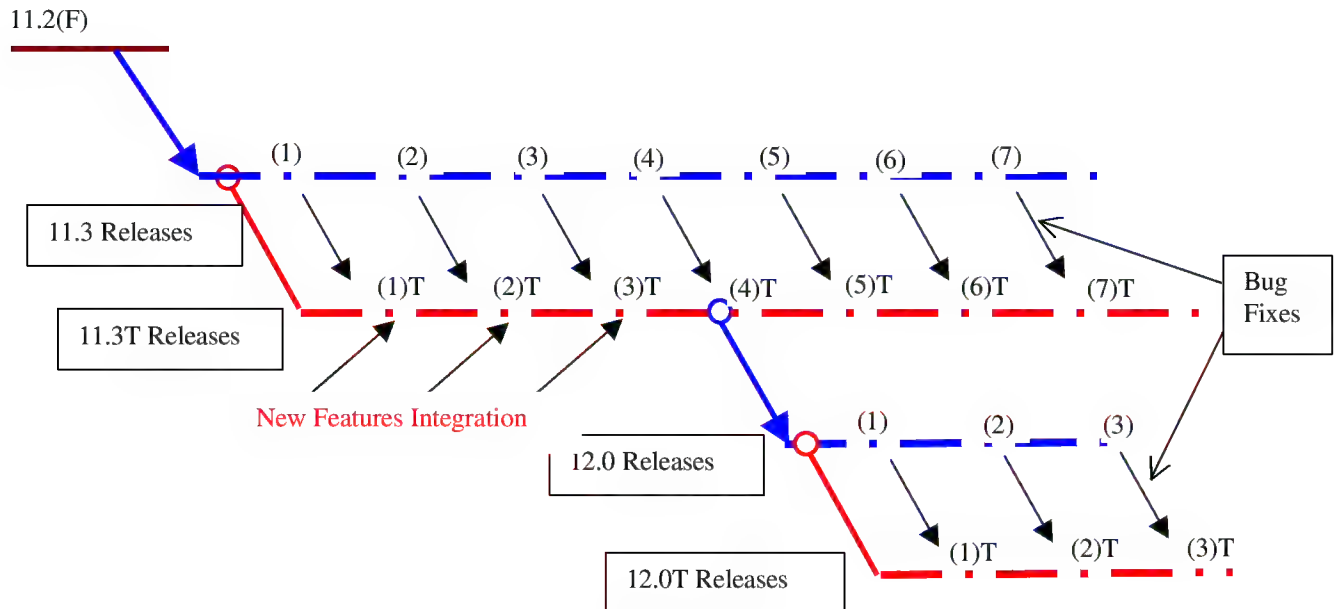
Figure 1.4: CTED – pre-dating Cisco IOS 12.0T

It is important to note that in this scenario, the CTED train continues to coexist in MM mode with the main release train. While in MM mode, its feature and platform acceptance characteristics are similar to that of a main release train; therefore, subsequent maintenance revisions provide only bug fixes and no new functionality is added.

Cisco IOS 11.3T is an example of pre-release 12.0 which follows the above model. Cisco IOS release train 11.3T gave birth to 12.0 main release at 11.3(3.2)T and stopped accepting new features at 11.3(4)T; however, it continued to provide bug fixes in MM mode until 11.3(11)T when it reached EOE in August 1999.

1.4.5. Specific Technology Early Deployment Releases

As the name indicates, STED releases have similar feature commitment characteristics as CTED releases except that they target a specific technology or market theater. They are always released on specific platforms and are solely under the supervision of a Cisco BU. The BU owner of a STED train follows a certain number of guidelines:

- Regular synchronization with the parent Cisco IOS
- Scheduled maintenance revisions
- Convergence to the next Cisco IOS main release

Aside from these restrictions, the BU freely manages the STED release to meet the targeted market and customer requirements.

STED releases are identified using two letters appended to the major release version. Cisco IOS releases 11.1CA, 11.1CC, 11.1CT, 11.3NA, 11.3MA, 11.3WA, and 12.0DA are all examples of STED releases.

1.4.6. Specific Market Early Deployment Releases (SMED)

There exists another type of hybrid specific technology release. These releases are called "specific market releases" as they target a specific market segment. The Cisco IOS SMEDs are differentiated from STEDs by the fact that they target a specific market segment (ISPs, enterprises, financial institutions, telcos, and so on). Although they are managed exactly as STEDs, SMEDs transcend specific technology barriers to achieve business solutions for a given market segment. In that sense, they are more like the CTEDs. On the other hand, they are built only for specific platforms of relevance to the targeted market. This later characteristic is similar to a STED.

For example, Cisco IOS 12.0S (SMED for the ISP market) delivers an array of cross-BU technology solutions that are of primary interest to service providers. However, the images are only built on selected hardware such as the Cisco 12000 series routers, the 7500 series routers, and the 7200 series routers (3600 series router images are built, but not commercially available). As a result of this hybrid nature, Cisco IOS SMED releases are identified by one alphabetic character appended to the major release version (just like the CTED). Examples of SMEDs are Cisco IOS 12.0S and 12.1E.

As a general rule, STED and SMED Cisco IOS releases provide new features and/or portware support additions with each maintenance revision. Since the code base is the same as the major Cisco IOS release from which it is rooted, the STED is required to frequently synchronize with its parent to inherit bug fixes that have been applied to the parent. In addition to synchronizing bug fixes, maintenance and interim revisions provide bug fixes specific to the STED (the portion of the code that is different from the parent's code base).

11.3 Releases

(1)   (2)   (3)   (4)   (5)   (6)   (7)

11.3T Releases

(1)T   (2)T   (3)T   (4)T   (5)T   (6)T   (7)T

11.3NA STED Releases

(3)NA   (4)NA   (5)NA   (6)NA   (7)NA

STED Specific New Features Integration
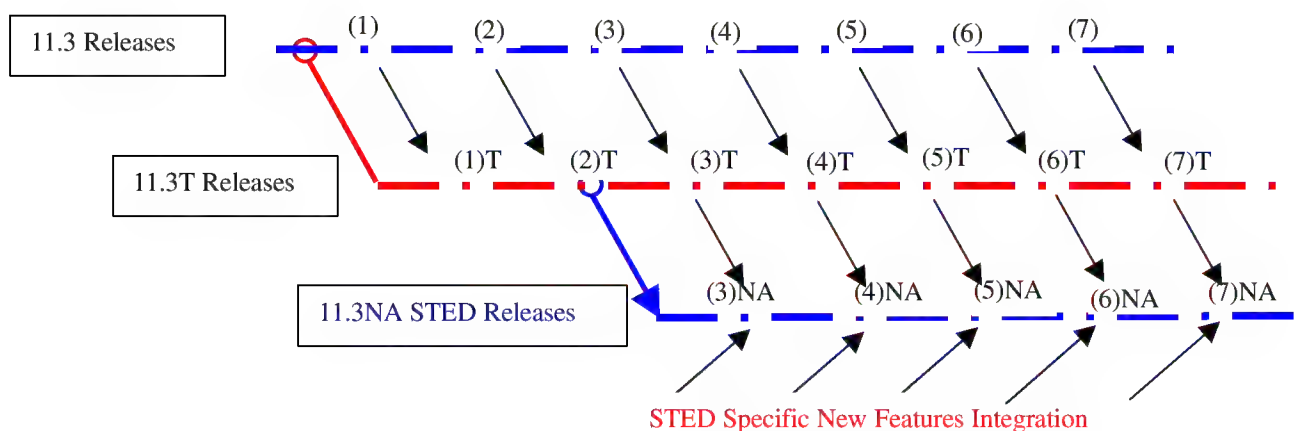
Figures 1.5: STED, Origin and migration (Post 12.0 release)

11.3(4)T

Main Line Releases

No new functionality – bug fixes only

12.0 Main Line

(1)   (2)   (3)   (4)   (5)   (6)   (7)   (8)   GD*

Bug sync from Main to CTED

12.0T CTED

(1)T   (2)T   (3)T   (4)T   (5)T   (6)T   **12.1(1)**   (2)   (3)

Specific Technology ED provides
additional features & functionality with
each maintenance revisions

Bug sync from CTED to STED

12.0DB STED

(2)T   (3)T   (4)T   (5)T   (6)T   (7)

12.1(1)T

Features of the STED are
ported to the new CTED

| (2) | = 12.0(1) |
| (1)T | = 12.0(1)T |
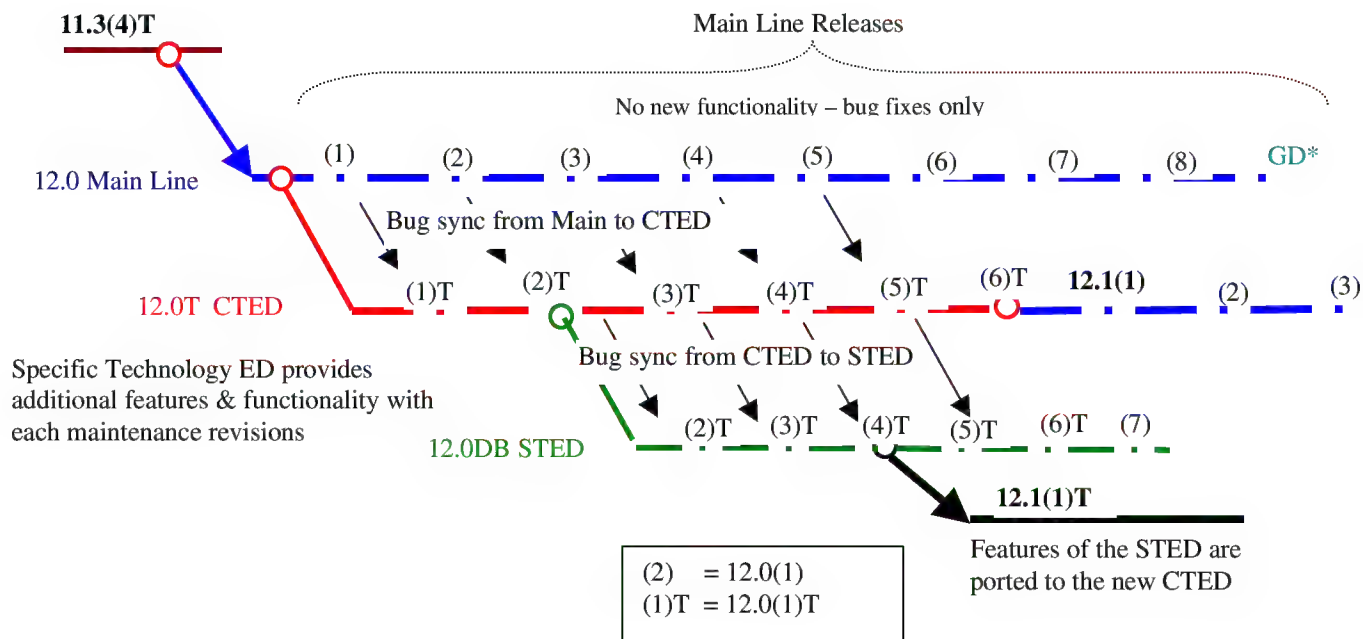
Figure 1.6: STED, Origin and migration (Post 12.0 release)

1.4.7. X Releases or Short-lived ED Releases (One-time Releases)

Although Cisco IOS X releases have existed since Cisco IOS 11.2, they proliferated with the redefinition of the Cisco IOS release model, which was implemented to coincide with the release of Cisco IOS version 12.0. The new release model, authored by Mack Coulibaly, dissociates Cisco IOS ED names from their parent BU and aligns them with the underlying technology for which they are created. This change was necessary to better prepare Cisco IOS to support the rapid growth of the company's product lines. From 1998 to 1999, the number of hardware and new technology software features introduced in Cisco IOS has quadrupled. With that kind of growth rate, it was necessary to find a way to allow the corporation to expand as fast as it could while maintaining the integrity of the Cisco IOS software. The X releases provided such a vehicle.

The new model allowed any BU (or multiple BUs with similar or complementary technology encouraged to combine efforts) to pull a private branch of the Cisco IOS CTED, integrate new platforms or technology, and deliver it to the marketplace without compromising the entire Cisco IOS release train. After successful field deployment, the feature/technology delivered by the X release is immediately ported to one of the next CTED maintenance revisions which carries it into the main stream of Cisco IOS.
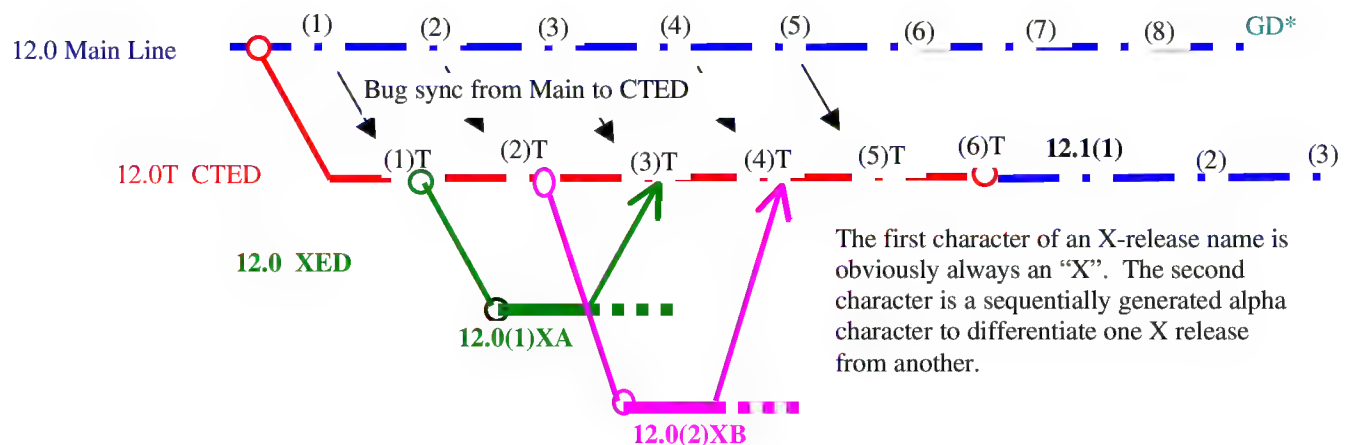
Figure 1.7: Cisco IOS XED Release

Cisco IOS X Release Early Deployment (XED) releases introduce new hardware and new technologies to the market. They do not provide software maintenance revisions nor do they provide regular software interim revisions. If a defect is found in the XED prior to its convergence with the CTED, a software rebuild is initiated and a number is appended to the name (for example, Cisco IOS 12.0(2)XB1 and 12.0(2)XB2 are examples of 12.0(2)XB rebuilds).

1.5. Cisco IOS Features Integrated into the Releases

There are several ways to commit features to a Cisco IOS release:

1. Commit to an ED release.
2. Commit via a bug fix (not discussed in this document).

The most common route to commit a feature or hardware to Cisco IOS is through the ED releases. There are several ED release vehicles.

1.5.1. Commit to Cisco IOS CTED

Cisco IOS CTED is a Cisco-wide release (a major release committed to CTED is managed by a central program manager who is appointed by the Cisco IOS Technology Division). The program manager's role is to see that development teams from various Cisco BUs abide by the Cisco IOS commit process. This process was put in place to help manage the Cisco IOS code repository that is constantly being modified by development engineers.

Here is the high level view of the Cisco IOS feature commit process:

1. Pull a private branch of the Cisco IOS CTED and make the necessary additions and modifications to make the feature or hardware work. Test the private code individually, test it with other hardware, and test it against existing Cisco IOS software.

2. If it is new hardware or a new protocol, an Early Field Trial (EFT) is required. This is to ascertain that the requesting customer(s) is satisfied with the basic functionality of the software. It also provides Cisco Systems, Inc. with the ability to design software that meets customers' expectations.

3. A cross-functional commit review meeting (with engineering, marketing, Customer Advocacy, source management, and documentation groups) is held to verify that the development team has met all the commit prerequisites to commit their code into the pre-integration branch of Cisco IOS CTED.

4. The purpose of the pre-integration branch is to assure that features that were individually committed in private branches can coexist in one common branch without failing. They fail occasionally, and then conflict resolution among the various development teams starts. Once all conflicts are resolved and each development team has successfully tested their functionality in the common branch, the pre-integration branch is then merged to a synchronization point of the Cisco IOS CTED.

This process ensures proper control and management of the Cisco IOS code repository that is constantly being modified by thousands of engineers and distributed around the world.
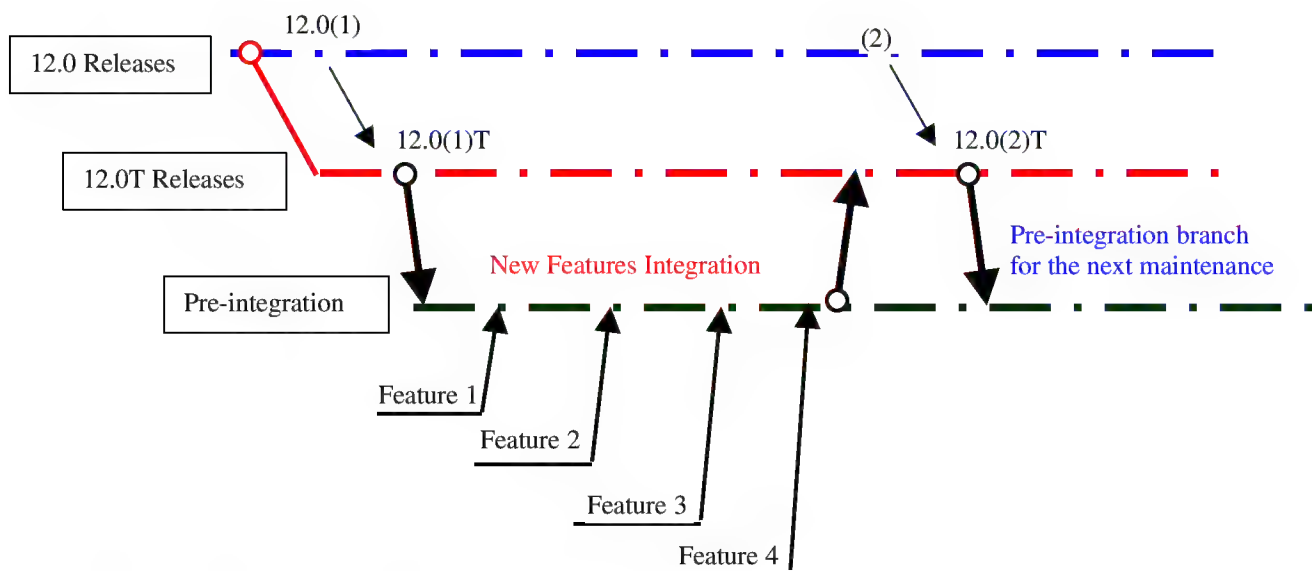
Figure 1.8: Cisco IOS XED Feature Integration Process

Page 17

Cisco IOS Reference Guide by Mack M. Coulibaly   Cisco Systems, Inc.

From the above description, it may take the development team of a particular BU anywhere from three to five months before their feature or hardware reaches customers via a Cisco IOS CTED. While this time frame may appear reasonable for most businesses, it is clearly too long for the Internet community; hence, the creation of Cisco IOS STED. The addition of features and/or technology to STED is much simpler and allows faster time-to-market.

1.5.2. Feature Commit to Cisco IOS STED and SMED

In contrast with CTED, Cisco IOS STEDs are managed by the Cisco BU or LOB owner and only support a limited number of platforms. This allows the development team the freedom to operate within a limited set of guidelines, mostly imposed by the Cisco IOS Serviceability Design Engineering team of Customer Advocacy.

Among the criteria are:

- Per maintenance release documentation and release notes.
- Product bulletins for every major technology introduced by the STED.
- Provision for regularly scheduled maintenance releases that provide successive bug fixes.
- Convergence of all the features and hardware delivered by STED into the next major release (CTED or main release).

The process of adding features and hardware to Cisco IOS STED is very similar to the one followed by CTED except that it does not have to go through the central commit review and it does not need to meet the criteria to commit in the CTED pre-integration branch. The BU and/or the development team holds its own commit reviews and peer review sessions.

Insert 3 Diagrams: STED Commit and SMED Commit
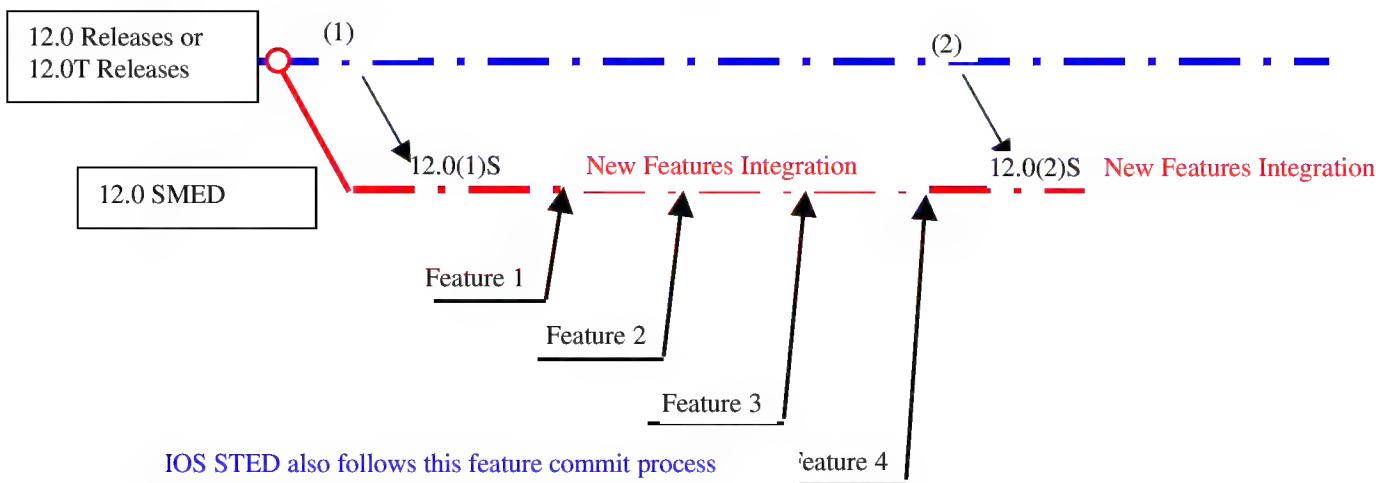
Figure 1.9: Cisco IOS SMED/STED Feature Integration Process

Page 18

Cisco IOS Reference Guide by Mack M. Coulibaly   Cisco Systems, Inc.

Most new technologies developed by Cisco Systems, Inc. first appear in ED releases. They subsequently converge to a later major release to become part of the mainstream Cisco IOS.

Cisco IOS STEDs are expensive to maintain as they require a separate management team including program management, source management, build groups, regression test facilities, documentation, and so on. Additionally, a STED is maintained for a standard Cisco IOS life cycle which can last from 12 to 24 months. For those reasons, STEDs are not always the best choice. This leads us to the last alternative, the X releases or XED.

1.5.3. Feature Commit to Cisco IOS XED

Cisco IOS X releases are one-time release vehicles introducing new technology to the market. Cisco BUs or LOBs with time-to-market constraints will use Cisco IOS X release trains as a vehicle for bringing features and hardware to the market.

Here's the scenario:

A development team has successfully tested its hardware or new feature. They are ready for the market, which demands it. However, the next possible commit window for Cisco IOS CTED is four months away. It is not in Cisco's interest nor is it in the customer's interest to wait that long; hence, the product team uses Cisco IOS XED or short-lived Cisco IOS releases to bridge the gap between the time the product is ready and next possible entry point in the Cisco IOS CTED.
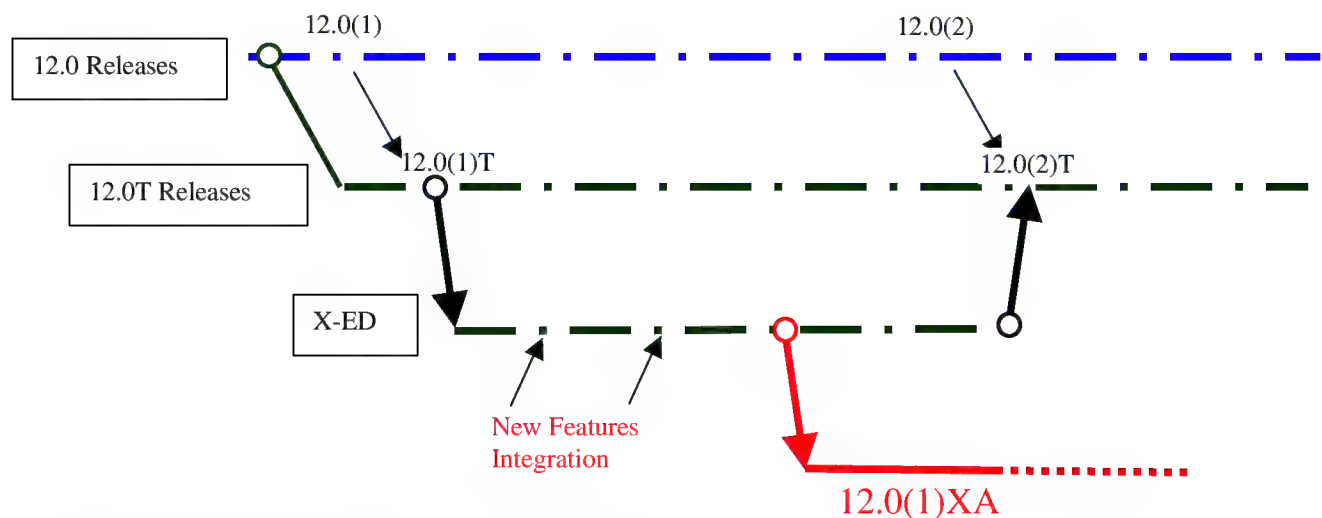
Figure 1.10: Cisco IOS XED Feature Commit Process

Page 19

Cisco IOS Reference Guide by Mack M. Coulibaly   Cisco Systems, Inc.

1.5.4. Importance of Unifying Cisco IOS Releases

Why is it such convoluted release processes? The answer is two-fold:

1. To provide internetworking technology in a unified and consistent software environment with familiar interface and command syntaxes from which engineers and system administrators can build expertise.

2. To provide system administrators with a forward upgrade capability without the loss of previously acquired functionality.

The latter point is a very important one, especially in today's internetworking community where an autonomous system may include more than 5000 routers and switches distributed around the world.

It then becomes very important for the customer, the corporation, or the service provider to be able to upgrade to a newer version of a Cisco IOS release with the explicit guarantee that all previously configured features will continue to operate while new fixes and new functionality are added. As a corporation, Cisco has not always succeeded in this attempt. In fact, prior to Cisco IOS 12.0 and parented ED releases, the Cisco IOS software had substantially diverged with Cisco IOS 11.1CA, 11.1CC, and 11.1CT.
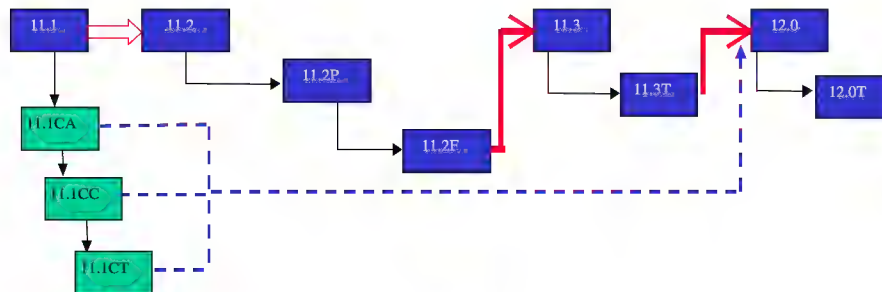
Figure 1.11: Cisco IOS 11.1 ED Divergence

The consequence of this divergence is best illustrated by the following example:

The PA-4E1G port adapter was supported in Cisco IOS 11.1CA, but was not supported in 11.2, 11.2P, or 11.3. The PA-4E1G was finally ported to 12.0 with the unification of the releases.

For a period of time, the port adapter PA-4E1G was only supported in Cisco IOS 11.1CA. It was not supported in 11.2, 11.2P, or 11.3. As a result, network designs with PA-4E1G were unable to implement any other Cisco IOS software except for 11.1CA. Until the recent port of the PA-4E1G to Cisco IOS 12.0 releases, the unlucky networks were, in effect, denied the opportunity to take advantage of newer Cisco IOS features introduced in major releases.

Another example of features with similar dire consequences is Hot Standby Routing Protocol (HSRP) support for ATM LAN emulation (LANE). This feature was introduced in Cisco IOS 11.2 (see Figure 1.11 above), thereby skipping Cisco IOS 11.1CA, 11.1CC, and 11.1CT. Hence, networks that were limited to using 11.1CA could not implement designs that took advantage of this important redundancy feature.

As you can see from the above diagram, some network administrators have found themselves on the 11.1CA, 11.1CC ED path and are unable to benefit from the features and enhancements introduced in the 11.2 and 11.3 major releases.

In an effort to prevent feature divergence of the types mentioned above, clear engineering methodology that systematically unifies the Cisco IOS releases has been implemented. Indeed, as discussed later in this document, the creation of Cisco IOS release 12.0 was a major unification milestone that brought together features and platforms otherwise deployed in disparate releases.

1.6. Relationship Between the Releases and the Cisco IOS Roadmap

The most up-to-date version of the Cisco IOS roadmap is available on CCO at the following URL: http://www.cisco.com/warp/customer/620/roadmap.html
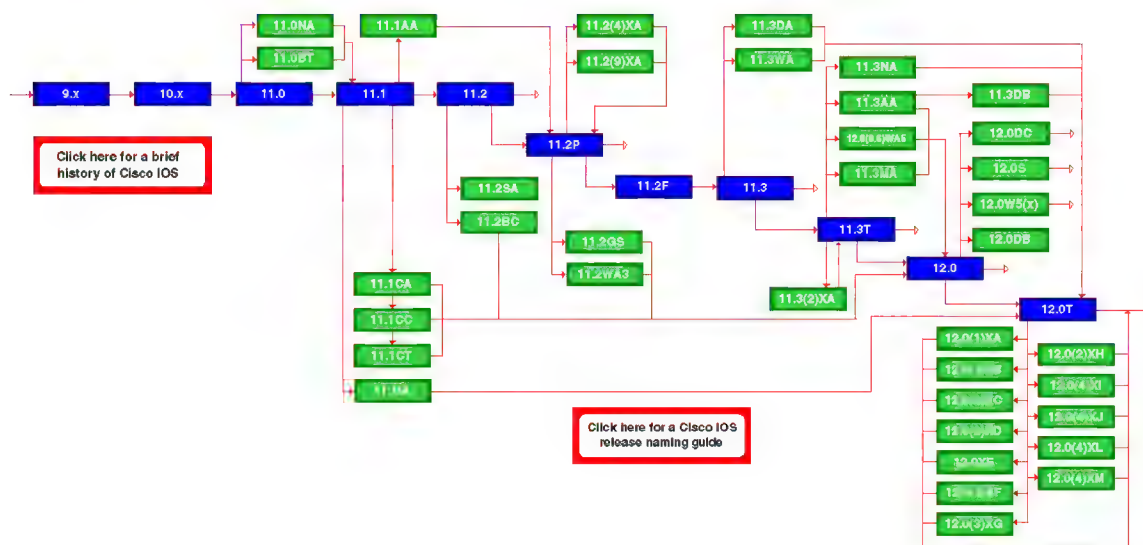
Figure 1.12: Cisco IOS Roadmap

2. Cisco IOS Release Naming Convention

Letters or group of letters are assigned to ED Technology releases. The following letter definitions apply when these letters are in the <u>first position</u> of a Cisco IOS ED name:

    A = Access Server/Dial technology (for example, 11.3AA)
    D = xDSL technology (for example, 11.3DA)
    E = Enterprise feature set (for example, 12.1E)
    H = SDH/SONET technology (for example, 11.3HA)
    N = Voice, Multimedia, Conference (for example, 11.3NA)
    S = Service Provider (for example, 12.0S)
    T = Consolidated Technology (for example, 12.0T)
    W = ATM/LAN Switching/Layer 3 Switching (for example, 12.0W5)

Technology ED releases use two letters. The first letter represents the technology and the second letter is used for differentiation.

An 'X' in the first position of the release name identifies a one-time release based on the CTED "T" train (for example, XA, XB, XC, and so on).

An 'X' or 'Y' in the second position of the release name identifies a short-lived ED release based on (or affiliated to) a STED release (for example, 11.3NX[1] (based on 11.3NA), 11.3WX[1] (based on 11.3WA), and so on).

---

[1] Not an actual IOS release

Cisco IOS Reference Guide by Mack M. Coulibaly   Cisco Systems, Inc.

The Cisco IOS STED, SMED, or XED numbering system always reflects the synchronization point to its parent CTED. Hence, Cisco IOS 12.0(2)NA is synchronized (bug fix compatible) to 12.0(2)T.

12.0

12.0T

12.0(2)T

12.0NA

12.0(2)NA   12.0(4)NA
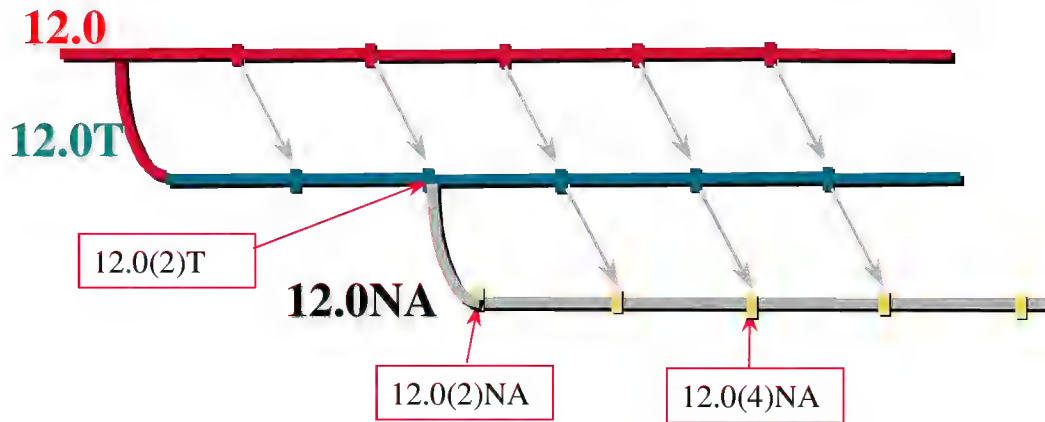
Figure 2.1: Cisco IOS STED/SMED

12.0

12.0T

12.0(2)T

12.0(2)XA

12.0(5)T
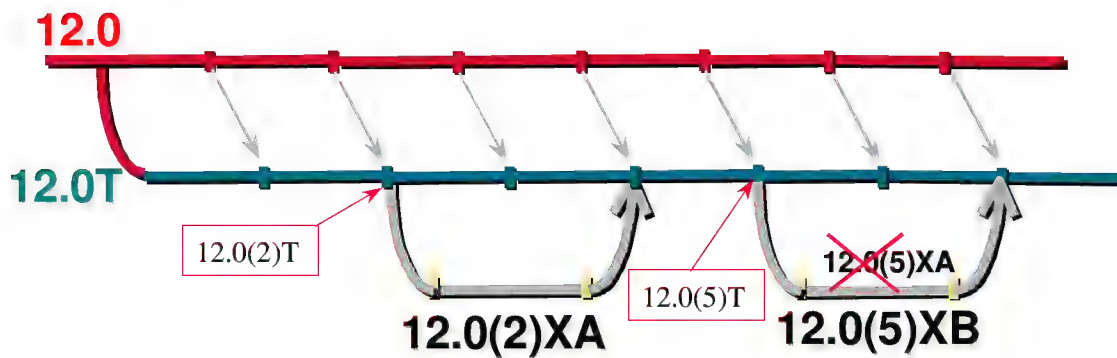
~~12.0(5)XA~~

12.0(5)XB

12.0(2)XA may introduce a new module on the 3600 while 12.0(5)XB introduces the new Cisco 800 series.   Therefore12.0(5)XB is NOT a logical migration path for 12.0(2)XA.

Figure 2.2: Cisco IOS XED

Page 23

Cisco IOS Reference Guide by Mack M. Coulibaly   Cisco Systems, Inc.

2.1. Cisco IOS Version Numbering Convention

Once a Cisco IOS name is selected, the software images are delivered to the customer using the following maintenance and interim revision numbering scheme:
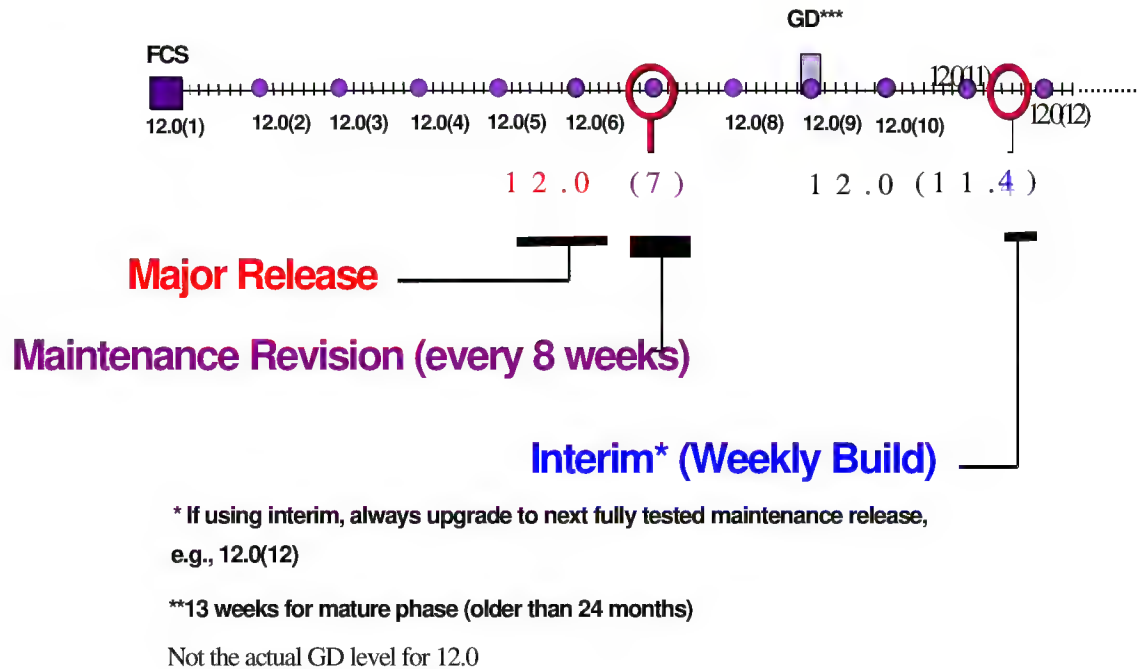
Figure 2.3: Cisco IOS Main Releases Numbering Convention

Note that the Cisco IOS interim images are not readily available to customers. Only maintenance build images are shipped and/or made available via CCO.
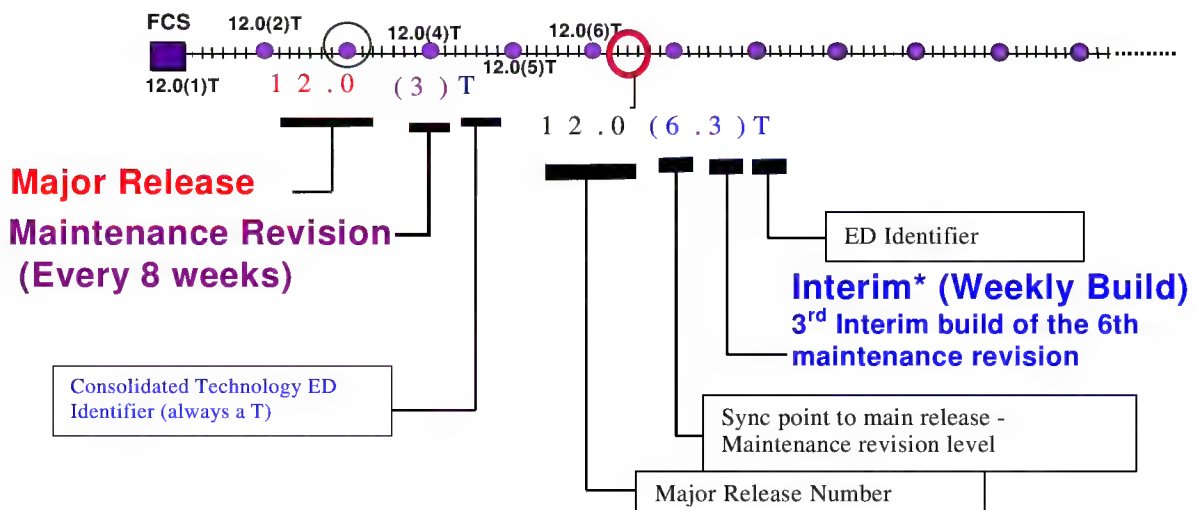
Figure 2.4: Cisco IOS CTED Numbering Scheme

Page 24

Cisco IOS Reference Guide by Mack M. Coulibaly   Cisco Systems, Inc.

2.1.1. Cisco Main Release Rebuild Numbering System

FCS Main Release

12.0(1) 12.0(2) 12.0(3) 12.0(4) 12.0(5) 12.0(6)

12.0(3 a)

Rebuild of 12.0(3)
Maintenance In case of major defect

Maintenance Revision Level

If the Cisco IOS release name ends with letter, then a number is appended to the rebuild; however, if the Cisco IOS release name ends with number, then a letter is appended to the rebuild.
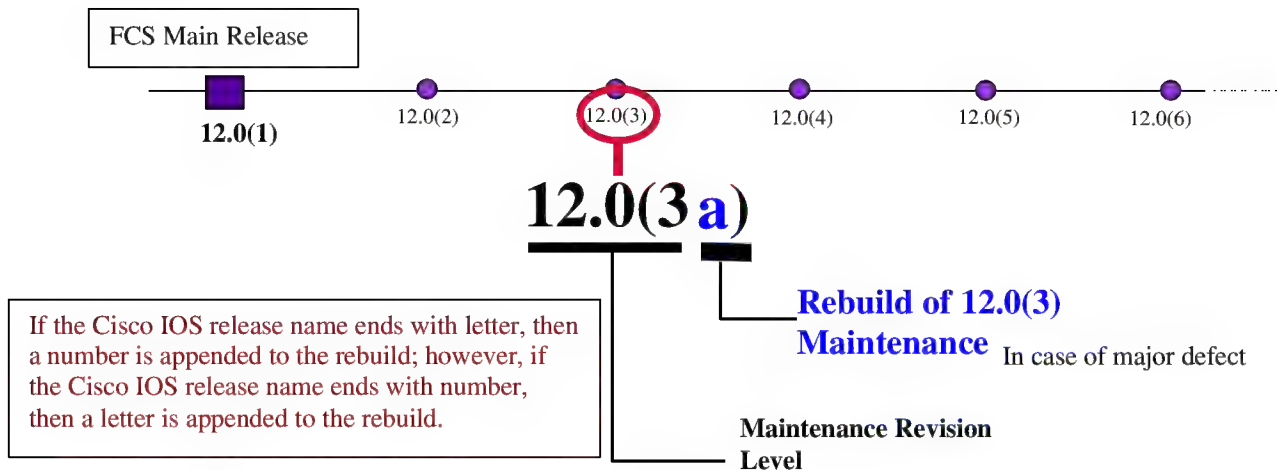
Figure 2.5: Cisco IOS Main Release Rebuild Numbering Scheme

2.1.2. Cisco IOS ED Rebuild Numbering System

FCS CTED Release

12.0(1)T 12.0(2)T 12.0(3)T 12.0(4)T 12.0(5)T 12.0(6)T

12.0(3)T 1

Rebuild of 12.0(3)T
Maintenance
In case of major defect

Maintenance Revision Level

Note that there could be several Cisco IOS rebuilds (for example, 12.0(4b) or 12.0(5)T3), where 12.0(4b) is the rebuild for 12.0(4a). In this case, 12.0(4a) would have been deferred because of another major defect. The same would be true for 12.0(5)T3.
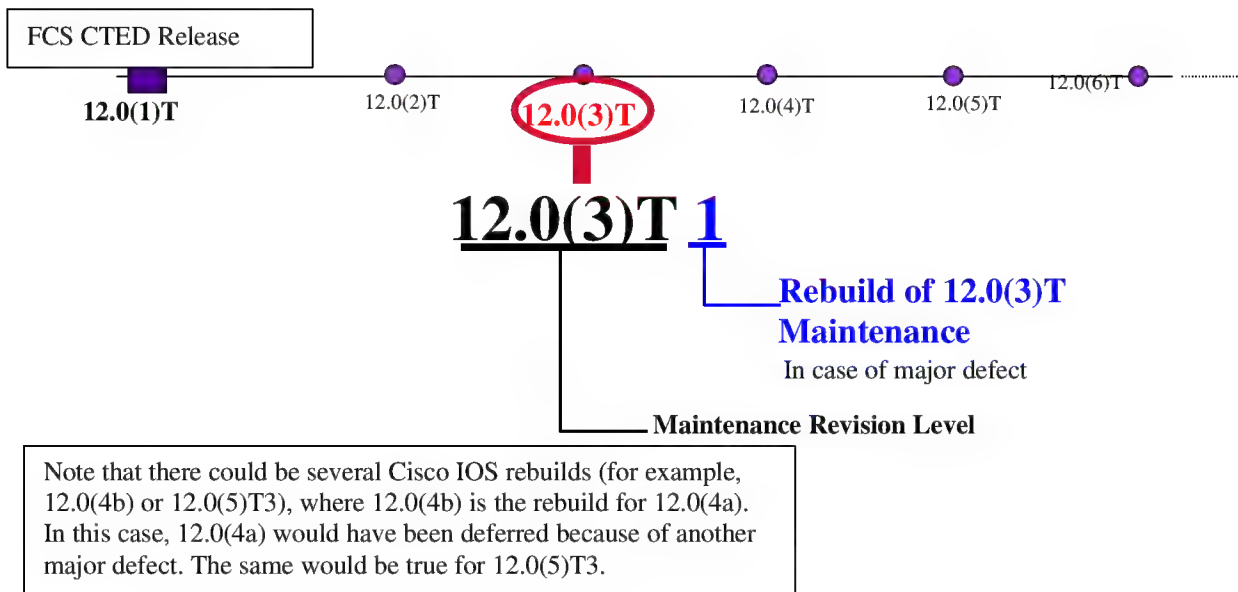
Figure 2.6: Cisco IOS CTED Rebuild Numbering Scheme

11.3(1)T

Specific Tech ED

11.3(2)T   11.3(3)T   11.3(4)T   11.3(5)T   11.3(6)T

11.3(2)NA   11.3(3)NA   11.3(4)NA   11.3(5)NA   11.3(6)NA

11.3(3) NA 1

**Renumber Build of
11.3(3)NA Level**
In case of major defect

ED Identifier

**ED Sync Point to Parent
Major Release**
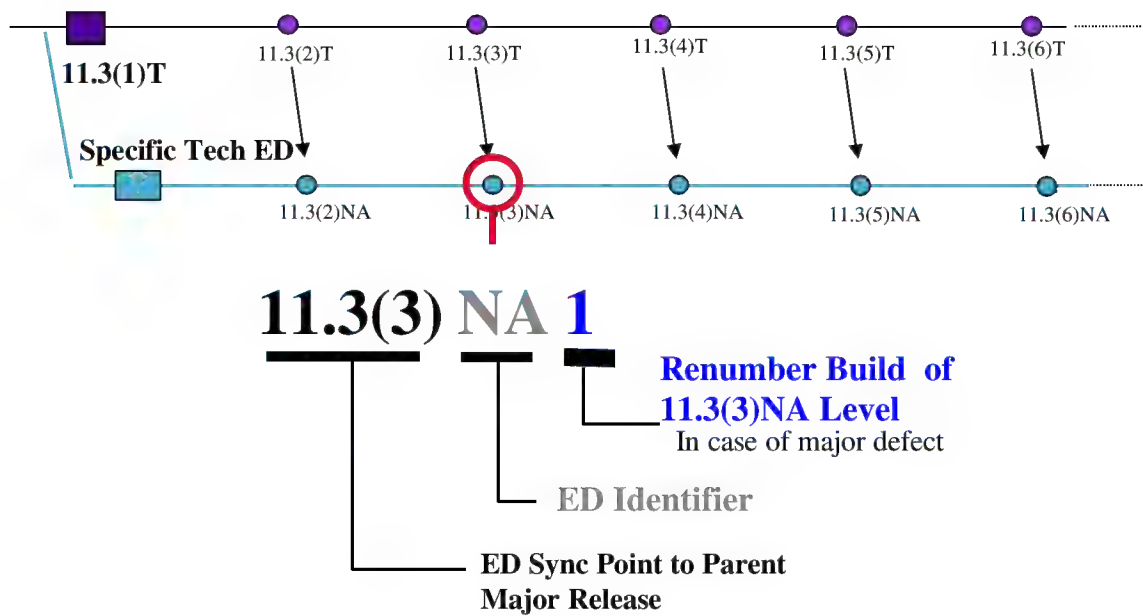
Figure 2.7: Cisco IOS STED Re-numbering Scheme

2.1.3. Exception to the Rule: Wx Releases

The Cisco IOS Wx STEDs (11.2WA, 11.3WA, and 12.0W5) use a slightly different numbering system. The diagrams below show this exception to the Cisco IOS numbering system:

FCS of Major IOS release

11.3(1)   11.3(2)   11.3(3)   11.3(4)   11.3(5)   11.3(6)

11.3(4)WA4(6)

Specific Tech ED
Release

11.3(2)WA(5)   11.3(6)WA(8)

11.3(4)WA4(6)

ED Sync Point to Parent Major Release

Maintenance Revision Number
6th maintenance revision of 11.3WA4

STED Major Release Number

ED Identifier

This numbering process applies to Cisco IOS 11.2WA3, 11.3WA4, and 12.0W5 releases.
Note that these STEDs do not regularly synchronize to the parent release; however, they always show the synchronize point, indicated by the leading numbers. For example, if the above example was synchronize to 11.3(4a), then the number would have been 11.3(4a)WA4(6)

Figure 2.8 : Cisco IOS Wx Maintenance Release Numbering System

FCS Major Release

11.3(1)   11.3(2)   11.3(3)   11.3(4)   11.3(4a)   11.3(5)   11.3(6)

Bug Sync

Specific Tech ED
Release

11.3(2)WA(5)   11.3(4)WA4(6)   11.3(6)WA(8)

11.3(4a)WA4(6.1)

ED Sync Point to Parent Major Release

ED Identifier

Interim Revision Number

Maintenance Revision Number
6th maintenance revision of 11.3WA4 release

STED Major Release Number
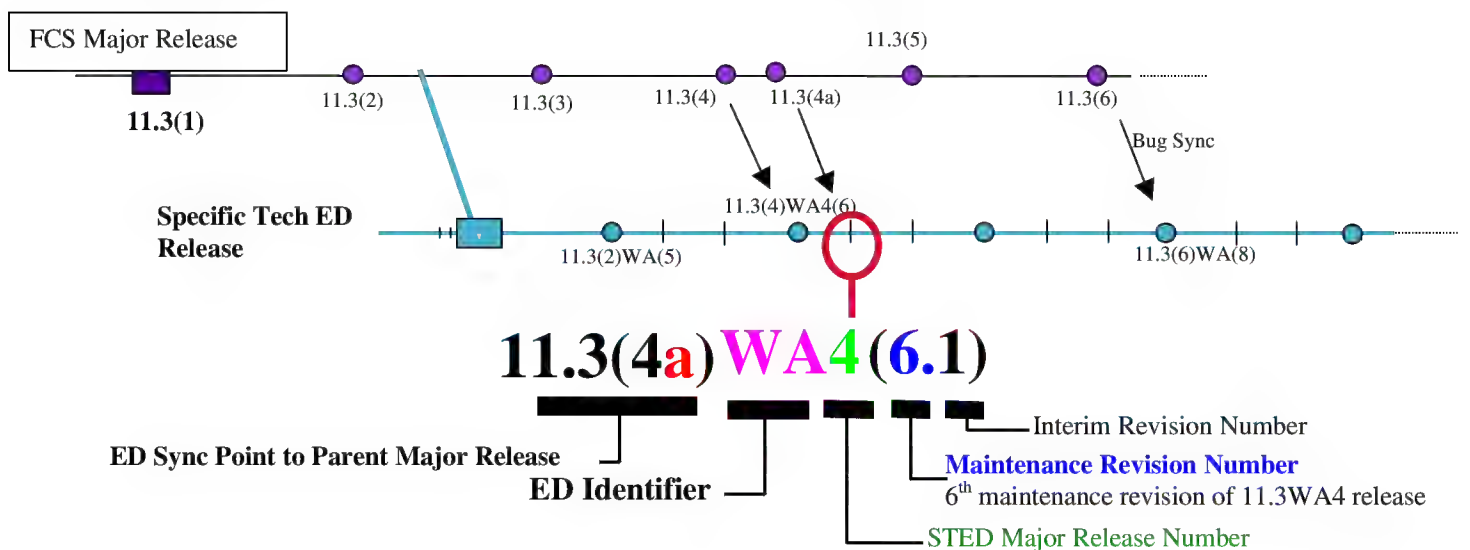
Figure 2.9: Cisco IOS Wx Interim Release Numbering System

2.1.4. Cisco IOS XED Rebuild Numbering System

FCS Major Release

12.0(1)   12.0(2)   12.0(3)   12.0(4)   12.0(5)   12.0(6)

FCS ED Release

12.0.0(1)T   12.0(2)T   **12.0(3)T**   12.0(4)T   12.0(5)T   12.0(6)T

Cisco IOS XED are one-time releases and do not provide regular maintenance revisions. Software image rebuilds are sometimes necessary to fix major defects. A letter is then added to the release number to differentiate the rebuild from the original build.

12.0(3)XD 1

Rebuild number

XED Identifier

Major release number

Sync point to parent
Consolidated Tech ED

Figure 2.10: Cisco IOS XED Rebuild Numbering Scheme

2.2.   Cisco IOS Image Naming Convention

Cisco Systems and other vendors who use Cisco IOS on routers, switches, and boards use a well-defined convention for naming software images. The convention identifies 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. The image name follows a three part format, where:

PPPPP = Platform
FFFF = Features
MM   = Run-time memory and compression format
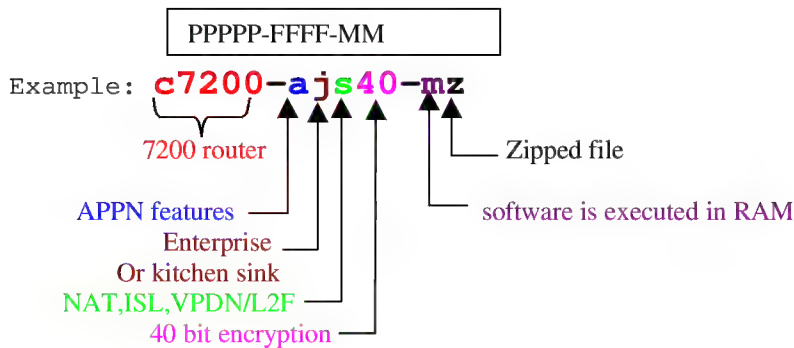
Figure 2.11: Cisco IOS Router and Switches Image Naming Scheme

2.2.1.   Platform Identifiers

The first part of the image name (PPPP) indicates the platform for this image, a Cisco c7200 series router. Table A.1 in the Appendix lists the available platform identifiers.

2.2.2.   Cisco IOS Image Names for Boards

Cisco IOS images that run on boards are named according to a scheme that identifies the board and the platform which supports the board. The names have three parts, separated by dashes (BBB-PPPP-MM).

BBB = Board
PPPP = Platform
MM   = Memory area of image execution and type of compression (see description in router section).
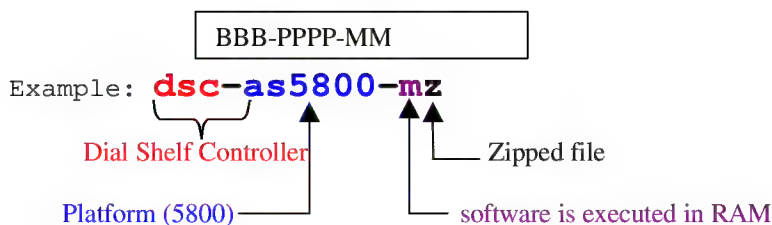
Figure 2.12: Cisco IOS Board and Controller Image Naming Scheme

The complete list of platform designators can be found in Table A.1 of the Appendix.

Page 29

Cisco IOS Reference Guide by Mack M. Coulibaly   Cisco Systems, Inc.

2.2.3. Feature Content of Cisco IOS Images

The second part of the image name (FFFF) identifies the feature content of the image (also referred to as the Cisco IOS feature set).

Example: c7200-**ajs56**-mz

In table A.2 in the Appendix, "**a**" stands for APPN features, "**j**" is for enterprise features (desktop plus all routing protocols), "**s**" is for the plus features such as NAT, Inter-switch Link (ISL), Layer 2 Forwarding (L2F), and virtual private dial-up networking (VPDN), and "**56**" stands for 56-bit encryption.

The letters are always specified in alphabetical order. The definition is fairly constant across the products on which they exist. The contents of the feature sets may be augmented over time, but they are never reduced. The following feature sets are defined.

The complete list of Cisco IOS feature set content identifiers is listed in Table A.2 in the Appendix.

2.2.4. Cisco IOS Run-time Memory Space

The third part of the image name designation (MM) is composed of two letters. The first letter identifies the memory area where the Cisco IOS image is executed at run time. The second letter indicates the method used to compress the Cisco IOS binary image.

Example: c7200-ajs56-**mz**

In the table below, "**m**" indicates that the software image runs in RAM and "**z**" indicates that the code is zip compressed.

Table 2.1: Cisco IOS Execution Area

f	Image runs in Flash
m	Image runs in RAM
r	Image runs in ROM
l	Image will be relocated at run time

Table 2.2: Cisco IOS Image Compression Identifiers

z	Image is Zip compressed (lower case z)
x	Image is Mzip compressed
w	Image is "Stac" compressed

Zipped Cisco IOS images are self-unzippable so that the users do not need to run extra commands to run the software. As far as the user is concerned, they only need to get the image into the router flash or ROM. At run-time, the image automatically unzips itself and relocates to the area of memory from where it is intended to run. No further action is necessary from the system administrator.

2.2.5. File Type Extensions

On occasion, Cisco IOS images or files accompanying these images have a suffix file extension designator such .tar. A .tar file is a utility used for packaging files together. These files are compressed using gzip or the UNIX compress utility.

Table 2.3: File Extension Definition

.tar	Gzip utility extension. File can be untar.
.html	Web browser viewable file

The .tar files are release notes or special instruction files provided to instruct customers of special handling. Some notes are also provided in .html files that are compatible for viewing with a web browser.

See the Appendix for a list of current Cisco IOS images.

2.3. How to Identify Cisco IOS Images Using Cisco IOS Banners

The **show version** command issued on any Cisco IOS generates the Cisco IOS banner that contains a wealth of information.

Cisco IOS image banners are strings that display information regarding the type of build from which the Cisco IOS image was produced, the release name, and whether it is an interim build, a maintenance build, or a rebuild. The Cisco IOS banner syntax is as follows:

```
Cisco Internetwork Operating System Software IOS (tm)
 <platform_series> Software (<image_name>), Version <version>[, <release_type>]
Copyright (c) 1986-<year> by Cisco Systems, Inc.
Compiled <day> <date> <time> by <user>
```

Table 2.4: Show Version Output Field Definitions

platform_series	Series number of the platform
image_name	Formal image name, as defined by Cisco IOS Image Naming Conventions
version	Release version number
release_type	Type of build and release vehicle

2.3.1. Release Type Definitions and Examples

The various types and examples of the release type field contents are as follows:

Table 2.5: Cisco IOS Release Type Definition

Release Type	Definitions
RELEASE SOFTWARE	Maintenance build images on major and consolidated Cisco IOS Technology.
EARLY DEPLOYMENT RELEASE SOFTWARE	Maintenance build images on a specific Technology and X releases.
MAINTENANCE INTERIM SOFTWARE	Interim builds on a major and consolidated Cisco IOS Technology releases.
EARLY DEPLOYMENT MAINTENANCE INTERIM SOFTWARE	Interim build of a specific Technology release (there are no interims on X releases).
CISCO DEVELOPMENT TEST VERSION	Shadow releases on major and CTED releases and pre-integration branch images (not for customer use).
EARLY DEPLOYMENT CISCO DEVELOPMENT TEST VERSION	Shadow releases on a BU-specific Technology releases. **Note:** To date, there are and have been no BU-specific release shadow builds.
BETA TEST SOFTWARE	Pre-FCS builds on major releases (main plus CTED) for the purpose of alpha, beta, and system testing.
EARLY DEPLOYMENT BETA TEST SOFTWARE	Pre-FCS builds on STED releases for the purpose of alpha, beta, and system testing.
fc1 build vs. fc2 build	'fc2' is an internal rebuild of the 'fc1' build. 'fc2' is usually created to fix a specific defect found in the 'fc1' build. An 'fc2' build cannot be created if the first build was already released to a public directory.
Maintenance rebuild	**12.0(2)T1** is a maintenance rebuild of 12.0(2)T, **12.0(3a)** is a maintenance rebuild of 12.0(3), and **11.3(6)AA2** is a maintenance rebuild of **11.3(6)AA1**, which is a rebuild of **11.3(6)AA.** If a catastrophic defect is found in a maintenance version of a software after it was released to the public, Cisco may decide to fix the defect in and re-release a new version with the fix as a rebuild image. The defective image is usually deferred and made inaccessible to customers.
Experimental	Cisco IOS special images. Image built by individual engineers to incorporate engineering changes.

2.3.2. Example of `show version` Banner Output

The following are examples of the **show version** command output on various Cisco IOS release types.

2.3.2.1. Release Software

Cisco IOS maintenance images on major releases (main release and CTED).

```
Cisco Internetwork Operating System Software IOS (tm)
GS Software (RSP-P-MZ), Version 11.0(16), RELEASE SOFTWARE (fc1)
Copyright (c) 1986-1997 by Cisco Systems, Inc.
Compiled Tue 24-Jun-97 12:07 by mcouliba

Cisco Internetwork Operating System Software IOS (tm)
C2600 Software (C2600-JS-MZ), Version 12.0(2a)T1, RELEASE SOFTWARE (fc1)
Copyright (c) 1986-1999 by Cisco Systems, Inc.
Compiled Wed 06-Jan-99 08:15 by dschwart
```

2.3.2.2. Early Deployment Release Software

Cisco IOS maintenance images on a specific Technology or X release trains.

```
Cisco Internetwork Operating System Software IOS (tm)
RSP Software (RSP-AJSV-MZ), Version 11.2(17)BC, EARLY DEPLOYMENT RELEASE
SOFTWARE (fc1)
Copyright (c) 1986-1999 by Cisco Systems, Inc.
Compiled Thu 21-Jan-99 16:23 by preetha

Cisco Internetwork Operating System Software IOS (tm)
GS Software (GSR-P-MZ), Version 11.2(9)GS7, EARLY DEPLOYMENT, RELEASE SOFTWARE
(fc1)
Copyright (c) 1986-1998 by Cisco Systems, Inc.
Compiled Wed 04-Mar-98 11:47 by tamb

Cisco Internetwork Operating System Software IOS (tm)
C2600 Software (C2600-AJS-MZ), Version 12.0(2)XD1, EARLY DEPLOYMENT RELEASE
SOFTWARE (fc1)
TAC:Home:SW:IOS:Specials for info
Copyright (c) 1986-1999 by Cisco Systems, Inc.
Compiled Mon 18-Jan-99 20:44 by ayeh
```

2.3.2.3. Maintenance Interim Software

Cisco IOS interim builds on major releases.

```
Cisco Internetwork Operating System Software IOS (tm)
GS Software (RSP-P-MZ), Version 11.0(15.1), MAINTENANCE INTERIM SOFTWARE
Copyright (c) 1986-1997 by Cisco Systems, Inc.
Compiled Mon 16-Jun-97 18:28 by jaturner

Cisco Internetwork Operating System Software IOS (tm)
RSP Software (RSP-P-MZ), Version 11.2(16.1)P, MAINTENANCE INTERIM SOFTWARE
Copyright (c) 1986-1998 by Cisco Systems, Inc.
Compiled Thu 22-Oct-98 20:08 by pwade
```

Note that interim builds have no 'fc1' string.

2.3.2.4. Early Deployment Maintenance Interim Software

Cisco IOS interim builds on a STED release (there is no interim for X releases).

```
Cisco Internetwork Operating System Software
IOS (tm) 7200 Software (UBR7200-P-MZ), Version 11.3(6.5)NA, EARLY DEPLOYMENT
MAINTENANCE INTERIM SOFTWARE
Copyright (c) 1986-1998 by cisco Systems, Inc.
Compiled Fri 20-Nov-98 07:11 by rnapier
```

2.3.2.5. Cisco Development Test Version

Shadow releases on major releases and pre-integration branch images (Cisco internal use only).

```
Cisco Internetwork Operating System Software IOS (tm)
5200 Software (C5200-D-L), Version 12.0(1.0.6), CISCO DEVELOPMENT TEST VERSION
Copyright (c) 1986-1998 by cisco Systems, Inc.
Compiled Tue 13-Oct-98 16:48 by phanguye
```

```
Cisco Internetwork Operating System Software IOS (tm)
 6400 Software (C6400-D-L), Version 12.0(6.6)PI, CISCO DEVELOPMENT TEST VERSION
Copyright (c) 1986-1999 by cisco Systems, Inc.
Compiled Tue 5-Apr-99 10:24 by phanguye
```

2.3.2.6. Beta Test Software

Pre-released builds of major releases. Note that version number has a leading zero.

```
Cisco Internetwork Operating System Software IOS (tm)
RSP Software (RSP-P-MZ), Version 11.3(0.10), BETA TEST SOFTWARE
Copyright (c) 1986-1997 by cisco Systems, Inc.
Compiled Mon 20-Oct-97 13:22 by tej
```

2.3.2.7. Early Deployment Beta Test Software

Pre-release builds specific Technology releases.

```
Cisco Internetwork Operating System Software IOS (tm) 4500 Software (C4500-J-
MZ), Version 11.3(0.8)MA, EARLY DEPLOYMENT, BETA TEST SOFTWARE
Copyright (c) 1986-1997 by cisco Systems, Inc.
Compiled Tue 14-Oct-97 20:54 by susingh
```

2.3.2.8. Software 'fc1' versus 'fc2' Build

Cisco IOS image banners usually contain an 'fc1' designator. Under certain circumstances (when the software has not been released to the public), an 'fc2' rebuild may occur. The release version number (for example, Cisco IOS 12.0(3)) for the rebuilt images remains exactly the same as the 'fc1' images. The only customer visible difference is the 'fc2' designator in the image banner which can only be viewed using the Cisco IOS **show version** command.

```
Cisco Internetwork Operating System Software IOS (tm)
2500 Software (C2500-IS-L), Version 12.0(3), RELEASE SOFTWARE (fc1)
```

```
Cisco Internetwork Operating System Software IOS (tm)
2500 Software (C2500-IS-L), Version 12.0(3), RELEASE SOFTWARE (fc2)
```

Page 34

Cisco IOS Reference Guide by Mack M. Coulibaly   Cisco Systems, Inc.

2.3.2.9. Cisco IOS X Releases

All X releases contain "EARLY DEPLOYMENT" as part of the banner line. As such, the banner for an X release will always state "RELEASE SOFTWARE."

```
Cisco Internetwork Operating System Software IOS (tm)
C2600 Software (C2600-AJS-MZ), Version 12.0(2)XD1,
EARLY DEPLOYMENT RELEASE SOFTWARE (fc1)
TAC:Home:SW:IOS:Specials for info
Copyright (c) 1986-1999 by cisco Systems, Inc.
Compiled Mon 18-Jan-99 20:44 by ayeh
```

2.4. Interpreting Cisco IOS Special Images or Engineering Built Images

Cisco IOS images built by individual development engineers in support of various customers' needs have the following banner string:

```
Cisco Internetwork Operating System Software IOS (tm)
2500 Software (C2500-P-M),
Experimental Version 12.0(19981031:235224) [mcouliba-conn_isp 203]
Copyright (c) 1986-1998 by cisco Systems, Inc.
Compiled Mon 02-July-99 05:41 by mcouliba
```

The engineer who compiled the image and the branch from which the image was built are indicated in brackets. In the above example, [mcouliba-conn_isp 203] means that "mcouliba" is the engineer and "conn_isp" is the Cisco IOS branch. Since "conn_isp" is the Cisco IOS 12.0S branch, this special (or engineering-built Cisco IOS image) is based on a 12.0S image.

2.4.1. Software Synchronization Level Banners

To indicate the synchronization level of the STED Cisco IOS release trains (11.1CA, 11.1CC, and 11.1CT), an additional "Synced to" line appears in the banner. This line indicates what version of the parent branch the BU-specific release is in synchronization with. This line also indicates the parent-child relationship between these ED releases and appears in the maintenance and interim images for 11.1CA, 11.1CC and 11.1CT.

```
Cisco Internetwork Operating System Software IOS (tm)
GS Software (RSP-J-MZ), Version 11.1(17)CA, EARLY DEPLOYMENT RELEASE SOFTWARE
(fc1)
Synced to mainline version: 11.1(17)
Copyright (c) 1986-1998 by Cisco Systems, Inc.
Compiled Tue 03-Feb-98 05:14 by richardd
```

```
Cisco Internetwork Operating System Software IOS (tm)
 GS Software (RSP-J-MZ), Version 11.1(17)CC, EARLY DEPLOYMENT RELEASE SOFTWARE
(fc1)
V111_17_CC_THROTTLE_BRANCH Synced to mainline version: 11.1(17)CA
Copyright (c) 1986-1998 by Cisco Systems, Inc.
Compiled Mon 23-Mar-98 21:08 by richardd
```

```
Cisco Internetwork Operating System Software IOS (tm)
GS Software (RSP-P-MZ), Version 11.1(17)CT, EARLY DEPLOYMENT RELEASE SOFTWARE
(fc1)
V111_17_CT_THROTTLE_BRANCH Synced to mainline version: 11.1(17)CC
Copyright (c) 1986-1998 by Cisco Systems, Inc.
Compiled Fri 01-May-98 17:46 by tlane
```

3. Appendix

3.1. Cisco IOS Main Release Life Cycle

Cisco IOS Main Release Life Cycle

First Commercial Shipment (FCS) & Limited Deployment (LD)

General Deployment (GD*)

End of Sales (EOS)

MM

End of Engineering Support (EOE)*

End of Life (EOL

0

18 - 28 mo

36 Mo.

End of TA Support 5 – 7 years

Regular Maintenance Releases

Mature Maintenance
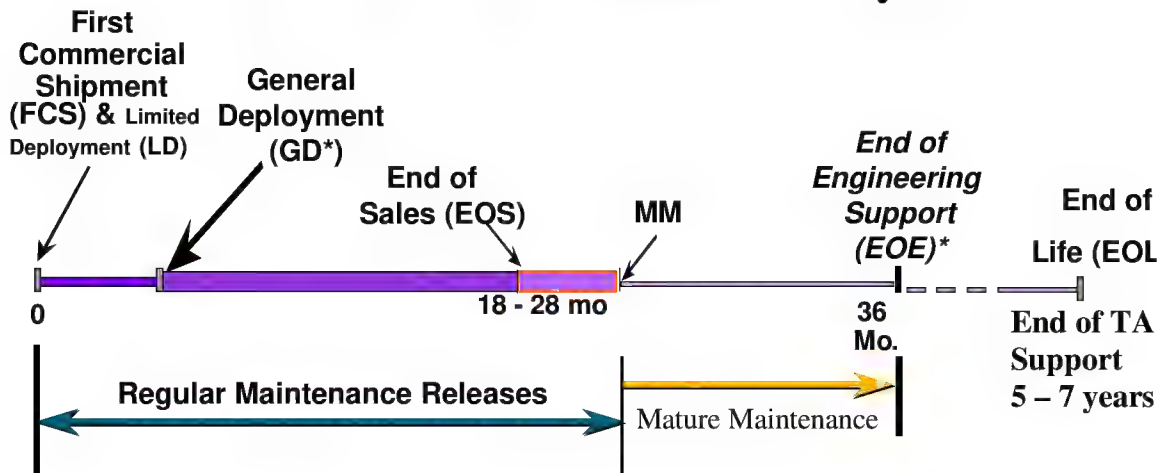
- Only main releases achieve GD certification. MM is to an ED what GD is to a mainline release.
- EOE occurs in 24 months, in which case the release goes into MM (maintenance revisions are provided every 16 weeks and only severity 1, severity 2, and priority 1, priority 2 defects are fixed).
- On occasion and when customers request, EOE is extended to 36 months or later, in which case there is no MM phase.
- All Cisco IOS releases are supported until EOL which occurs five years after it goes into EOS.

3.2. Cisco IOS Images Identifiers

The table below is also available on CCO at http://www.cisco.com/warp/customer/432/7.html.

Table A.1: Cisco IOS Platform Identifiers

Cisco IOS Image Platforms (PPPP) Definition

as5200	5200
ca1003	Cisco Advantage 1003
ca1005	Cisco Advantage 1005
cpa1003	CiscoPro 1003,4
cpa1005	CiscoPro 1005
cpa25	CiscoPro 2500
cpa3620	CiscoPro 3620
cpa3640	CiscoPro 3640
cpa45	CiscoPro 4500
*cs	Communication Server
cs500	cs500
c1000	1003,4
c1005	1005
c1600	1600
c2500	25xx,3xxx,5100, AO (11.2 and later only)
c25fx	Fixed FRAD
c2600	2600 Quake
c2800	Catalyst 2800
c2900	2910, 2950
c29atm	2900 ATM
c3620	3620
c3640	3640
c3800	3800
c4000	4000 (11.2 and later - earlier releases use xx)
c4500	4500, 4700
c5rsfc	Catalyst 5000 series
c5rsm	Catalyst 5k RSP
c5atm	Catalyst ATM
c6400s	6400 NSP
c6400r	6400 NRP
c6msm	Catalyst
c7000	7000,7010 (11.2 and later only)
c7200	7200
igs	IGS, 25xx,3xxx,5100, AP

gs3	Gateway server (AGS, AGS+)
gs7	Gateway server (7000,7010)
gsr	Gigabit Switch Router (12000)
ls1010	LightStream 1010
mc3810	Ardent Multiservice Cisco 3810
p<n	Partners' platform n
*pt	protocol translator
rpm	MGX 8850
rsp	75xx
ubr7200	Universal Broadband Router 7200
ubr900	Universal Broadband Router 900
ubr920	Universal Broadband Router 920
vcw	Voice Card Ware
xx	4000
Igsetx	2500 (media specific image that supports only Ethernet, token ring, and x.25)
Boards	
Das	Dial Shelf Feature board
Dsc	Dial Shelf Controller board Platforms

Cisco IOS Image Feature Definition (FFFF)

a

a	APPN
a2	ATM
a3	APPN replacement called SNA Switch (12.0(4)XN and 12.1)

b

b	AppleTalk
Boot	boot image

c

c	Comm-server/Remote Access Server (RAS) subset (SNMP, IP, Bridging, IPX, AppleTalk, DECnet, FR, HDLC, PPP, X,25, ARAP, tn3270, PT, XRemote, LAT) (non-CiscoPro)
c	CommServer lite (CiscoPro)
c2	Comm-server/Remote Access Server (RAS) subset (SNMP, IP, Bridging, IPX, AppleTalk, DECnet, FR, HDLC, PPP, X,25, ARAP, tn3270, PT, XRemote, LAT) (CiscoPro)
c3	Clustering

d

d	Desktop subset (SNMP, IP, Bridging, WAN, Remote Node, Terminal Services, IPX, AppleTalk, ARAP) (11.2 - DECnet)
d2	Reduced Desktop subset (SNMP, IP, IPX, ATALK, ARAP)
diag	Cisco IOS based diagnostic images

e

e	IPeXchange (prior to 11.3) StarPipes DB2 Access – Enables Cisco IOS to act as a "gateway" to all IBM DB2 products for downstream clients/servers in 11.3T
eboot	Ethernet boot image for MC3810 platform

f

f	FRAD subset (SNMP, FR, PPP, SDLLC, STUN)
f2	modified FRAD subset, EIGRP, PCbus, LAN Mgr removed, OSPF added

Page 39

Cisco IOS Reference Guide by Mack M. Coulibaly   Cisco Systems, Inc.

g

g	ISDN subset (SNMP, IP, Bridging, ISDN, PPP, IPX, AppleTalk)
g2	gatekeeper proxy, voice and video
g3	ISDN subset for c800 (IP, ISDN, FR)

h

h	For Malibu(2910), 8021D, switch functions, IP Host
hdiag	Diagnostics image for Malibu(2910)

i (not used for low end routers)

i	IP subset (SNMP, IP, Bridging, WAN, Remote Node, Terminal Services)
i2	subset similar to IP subset for system controller image (3600)
i3	reduced IP subset with BGP/MIB, EGP/MIB, NHRP, DIRRESP removed
i4	subset of IP (available on 5200)

j

j	enterprise subset (formerly bpx, includes protocol translation) *** not used until 10.3 ***

k

k	kitchen sink (enterprise for high-end) (same as bx) (Not used after 10.3)
k1	Baseline Privacy key encryption (On 11.3 and later)
k2	high-end enterprise w/CIP2 ucode (Not used after 10.3)
k2	Triple DES (On 11.3 and later)
k3	56bit encryption with secured shell (ssh)
k4	168bit encryption with secured shell (ssh)
k5	Reserved for future encryption capabilities (On 11.3 and later)
k6	Reserved for future encryption capabilities (On 11.3 and later)
k7	Reserved for future encryption capabilities (On 11.3 and later)
k8	Reserved for future encryption capabilities (On 11.3 and later)
k9	Reserved for future encryption capabilities (On 11.3 and later)

l

l	IPeXchange IPX, static routing, gateway

m

m	RMON (11.1 only)
m	For 11.2, Catalyst 2820-kernel, parser, ATM signaling, Lane Client, bridging

n

n	IPX

o

o	Firewall (formerly IpeXchange Net Management)
o2	Firewall (3xx0)
o3	Firewall with ssh (36x0 26x0)

p

p	Service Provider (IP RIP/IGRP/EIGRP/OSPF/BGP, CLNS ISIS/IGRP)
p2	Service Provider w/CIP2 ucode
p3	as5200 service provider
p4	5800 (Nitro) service provider

q

q	Async
q2	IpeXchange Async

r

r	IBM base option (SRB, SDLLC, STUN, DLSW, QLLC) - used with i, in, d (See note below.)
r2	IBM variant for 1600 images
r3	IBM variant for Ardent images (3810)
r4	reduced IBM subset with BSC/MIB, BSTUN/MIB, ASPP/MIB, RSRB/MIB removed.

s

s	source route switch (SNMP, IP, Bridging, SRB) (10.x releases)	
s	11.2(only) division by Platform	
	c1000	(OSPF, PIM, SMRP, NLSP, ATIP, ATAURP, FRSVC, RSVP, NAT)
	c1005	(X.25, full WAN, OSPF, PIM, NLSP, SMRP, ATIP, ATAURP, FRSVC, RSVP, NAT)
	c1600	(OSPF, IPMULTICAST, NHRP, NTP, NAT, RSVP, FRAME_RELAY_SVC) AT "s" images also have: (SMRP,ATIP,AURP) IPX "s" images also have: (NLSP,NHRP)
	c2500	(NAT, RMON, IBM, MMP, VPDN/L2F)
	c2600	(NAT, IBM, MMP, VPDN/L2F, VOIP and ATM)
	c3620	(NAT, IBM, MMP, VPDN/L2F) In 11.3T added VOIP
	c3640	(NAT, IBM, MMP, VPDN/L2F) In 11.3T added VOIP
	c4000	(NAT, IBM, MMP, VPDN/L2F)
	c4500	(NAT, ISL, LANE, IBM, MMP, VPDN/L2F)
	c5200	(PT, v.120, managed modems, RMON, MMP, VPDN/L2F)
	c5300	(MMP, VPDN, NAT, Modem Management, RMON, IBM)
	c5rsm	(NAT, LANE and VLANS)
	c7000	(ISL, LANE, IBM, MMP, VPDN/L2F)
	c7200	(NAT, ISL, IBM, MMP, VPDN/L2F)
	rsp	(NAT, ISL, LANE, IBM, MMP, VPDN/L2F)

t

t	AIP w/ modified Ucode to connect to Teralink 1000 Data (11.2)
t	Telco return (12.0)

u

u	IP with VLAN RIP (Network Layer 3 Switching Software, rsrb, srt, srb, sr/tlb)

v

v	VIP and dual RSP (HSA) support
v2	Voice V2D
v3	Voice Feature Card

W

w	WBU Feature Sets (11.3WA and 12.0W5 releases)	
	i	IISP
	l	LANE & PVC
	p	PNNI
	v	PVC traffic shaping
w2	Cisco Advantage ED train Feature Sets	
	a	IPX, static routing, gateway
	b	Net Management
	c	FR/X25
	y	Async
w3	Distributed Director Feature Sets	

X

x	X.25 in 11.1 and earlier releases. Also available in 12.0T on c800 series
x	FR/X.25 in 11.2 (IpeXchange)
x	H.323 Gatekeeper/Proxy in 11.3 and later releases for 2500, 3620, 3640, mc3810

y (used for low end routers)

y	reduced IP (SNMP, IP RIP/IGRP/EIGRP, Bridging, ISDN, PPP) (C1003/4)
y	reduced IP (SNMP, IP RIP/IGRP/EIGRP, Bridging, WAN - X.25) (C1005) (11.2 - includes X.25) (c1005)
y	IP variant (no Kerberos, Radius, NTP, OSPF, PIM, SMRP, NHRP...) (c1600)
y2	IP variant (SNMP, IP RIP/IGRP/EIGRP, WAN - X.25, OSPF, PIM) (C1005)
y2	IP Plus variant (no Kerberos, Radius, NTP, ...) (c1600)
y3	IP/X.31
y4	reduced IP variant (Cable, MIBs, DHCP, EZHTTP)
y5	reduced IP variant (Cable, MIBs, DHCP, EZIP) Home Office
y6	reduced IP variant(c800)

Z

z	Managed modems

0-9

40	40 bit encryption
56	56 bit encryption
56i	56 bit encryption with IPSEC

See 'K' section for Triple DES and SSH

Obsolete

h	reduced desktop subset (SNMP, IP RIP/IGRP/EIGRP, Bridging, ISDN, PPP, IPX, AppleTalk) 1003/4
h	reduced desktop subset (SNMP, IP RIP/IGRP/EIGRP, Bridging, WAN - X.25, IPX, AppleTalk) 1005

3.3. Available Cisco IOS Images

Please note that this table may not include the most recent Cisco IOS images.

AVAILABLE CISCO IOS IMAGES
For routers and boards

Special Images
xx-r-m is xx-ir-mz minus BGP, EGP, OSPF, IP multicast, CDP, PPP, CHAT, ISDN, SMDS, X.25, and FRAME_RELAY.

igs-inr2-l is igs-inr-l minus SMDS, EGP/BGP, LEX, DHCP, NTP

c1005-xy2-m is c1005-xy-m plus OSPF/MIBS and PIM/MIBS/fast-switching, minus bridging/MIBS

OBSOLETE:

h - reduced desktop subset (SNMP, IP RIP/IGRP/EIGRP, Bridging,
    ISDN, PPP, IPX, AppleTalk) for 1003/4/5

Existing Cisco IOS Images for Cisco Routers

Pre-10.2	10.2	10.3	Description
gs7-k		gs7-k-m or gs7-k-mz	Enterprise 70x0
gs3-k		gs3-k-m	Enterprise AGS+
cs3-k		cs3-c-m	Comm-server ASM
igs-bpx	igs-bpx-l	igs-j-l	Enterprise 3xxx
igs-bfpx	igs-bpx-l	igs-j-l	Enterprise 25xx/3xx
	igs-cd-l	igs-c-l	Comm-server RAS
igs-df	igs-d-l		Desktop 25xx
igs-if	igs-i-l		IP 25xx
igs-isdn	igs-g-l		ISDN 2503/4I
igs-frad	igs-f-l		FRAD 2501/2CF
xx-k	(*obsolete*)		
xx-bpx		xx-j-m or xx-j-mz	Enterprise 4000
c4500-k	(*obsolete*)		
c4500-bpx	c4500-bpx	c4500-j-m or c4500-j-mz	Enterprise 4500
c4500-i	c4500-i-m		IP 4500
c4500-d	c4500-d-m		Desktop 4500
cs500-k	cs500-c-m		Comm-server CS500
igs-rxboot		igs-boot-r	Boot 2500/3xxx
xx-rxboot		xx-boot-r	Boot 4000
c4500-xboot		c4500-boot-m	Boot 4500
lex	lex-e		(this is NOT a router image)

The following image names have changed:

```
10.3(3)+        11.0(4)+                Description
c1000-h-m       c1000-bny               reduced DT 1003
c1005-h-m       c1005-bny               DT w/reduced WAN 1005
c1005-x-m       c1005-bnxy              reduced DT w/X.25 1005
c1005-y-m       c1005-xy                reduced IP 1005


11.0            11.1                    Description
gs7-k-mz        gs7-j-mz                Enterprise 70xx
gs7-ak-mz       gs7-aj-mz               Enterprise/APPN 70xx
rsp-k-mz        rsp-j-mz                Enterprise 75xx
rsp-ak-mz       rsp-aj-mz               Enterprise/APPN 75xx
```

11.1 Images   **11.2 Images**

```
c1005-bnxy-mz   c1005-bny-mz
c1005-bxy-mz    c1005-by-mz
c1005-nxy-mz    c1005-ny-mz
c1005-xy-mz     c1005-y-mz
c1005-xy2-mz    c1005-y2-mz


igs-ainr-l      c2500-ainr-l
igs-c-l         c2500-c-l
igs-d-l         c2500-d-l
igs-f-l         c2500-f-l
igs-fin-l       c2500-fin-l
igs-g-l         c2500-g-l
igs-i-l         c2500-i-l
igs-jm-l        c2500-js-l
igs-j-l         c2500-j-l
igs-p-l         c2500-p-l


xx-ainr-mz      c4000-ainr-mz
xx-d-mz         c4000-d-mz
xx-ir-mz        c4000-is-mz ***
xx-j-mz         c4000-j-mz
xx-p-mz         c4000-p-mz


c4500-ir-mz     c4500-is-mz ***


gs7-aj-mz       c7000-ajs-mz
gs7-ajv-mz      c7000-ajsv-mz
gs7-jv-mz       c7000-jsv-mz
gs7-j-mz        c7000-js-mz
gs7-pv-mz       c7000-pv-mz


c7200-aj-mz     c7200-ajs-mz
c7200-dr-mz     c7200-ds-mz
c7200-j-mz      c7200-js-mz


rsp-ajv-mz      rsp-ajsv-mz
rsp-jv-mz       rsp-jsv-mz
```

Following are the replacement images for Cisco IOS 11.1 images that are no longer available in 11.2 (the new image has new functionality or the previous functionality no longer exists).

```
as5200-jmz-l      c5200-js-l
as5200-dz-l       c5200-ds-l
as5200-iz-l       c5200-is-l
c1005-by-mz       c1005-by-mz
igs-aj-l          c2500-ajs-l
igs-dr-l          c2500-ds-l
igs-im-l          c2500-is-l
igs-imn-l         c2500-ds-l
igs-imnr-l        c2500-ds-l
igs-imr-l         c2500-is-l
igs-in-l          c2500-d-l
igs-ir-l          c2500-is-l
igs-inr-l         c2500-ds-l
xx-aj-mz          c4000-ajs-mz
xx-dr-mz          c4000-ds-mz
xx-in-mz          c4000-d-mz
xx-inr-mz         c4000-ds-mz
xx-ir-mz          c4000-is-mz
c4500-aj-mz       c4500-ajs-mz
c4500-dr-mz       c4500-ds-mz
c4500-in-mz       c4500-d-mz
c4500-inr-mz      c4500-ds-mz
c4500-ir-mz       c4500-is-mz
c7200-inu-mz      c7200-inu-mz
rsp-aj-mz         rsp-ajsv-mz
rsp-j-mz          rsp-jsv-mz
```

The following image names are added for Cisco IOS 10.2(2) and later:

```
igs-in-l          IP/IPX 2500
xx-in-mz          IP/IPX 4000
c4500-in-m        IP/IPX 4500
igs-ir-l          IP/IBM 2500
xx-ir-mz          IP/IBM 4000
c4500-ir-m        IP/IBM 4500
igs-inr-l         IP/IPX/IBM 2500
xx-inr-mz         IP/IPX/IBM 4000
c4500-inr-m       IP/IPX/IBM 4500
igs-dr-l          DT/IBM 2500
xx-dr-mz          DT/IBM 4000
c4500-dr-m        DT/IBM 4500
gs7-s-m           Source Route Switch 70x0
c1000-y-m         reduced IP 1003
rsp-k-m           Enterprise 7500
igs-p-l           Service Provider 25xx
xx-p-mz           Service Provider 4000
c4500-p-mz        Service Provider 4500
gs3-p-m           Service Provider AGS+
gs7-p-mz          Service Provider 70xx
rsp-p-mz          Service Provider 75xx
rsp-ak-mz         Enterprise/APPN 7500
gs7-ak-mz         Enterprise/APPN 7000
gs3-ak-mz         Enterprise/APPN AGS+
```

```
igs-aj-l          Enterprise/APPN 2500
igs-ainr-l        IP/IPX/IBM/APPN 2500
xx-aj-mz          Enterprise/APPN 4000
xx-ainr-mz        IP/IPX/IBM/APPN 4000
c4500-aj-mz       Enterprise/APPN 4500
c4500-ainr-mz     IP/IPX/IBM/APPN 4500
cpa25-y-l         reduced IP CiscoPro
cps25-cg-l        RAS/ISDN CiscoPro
igs-im-l          IP/RMON 2500
igs-imr-l         IP/IBM/RMON 2500
igs-imn-l         IP/IPX/RMON 2500
igs-imnr-l        IP/IPX/IBM/RMON 2500
igs-jm-l          Enterprise+RMON 2500
xx-r-mz           IBM no-frills 4000
c1000-by-m        IP,AT,ISDN 1003,4
c1000-ny-m        IP,IPX,ISDN 1003,4
c1005-bxy-m       IP,AT,X.25 1005
c1005-nxy-m       IP,IPX,X.25 1005
c1005-by-m        IP,AT,WAN - X.25 1005
c1005-ny-m        IP,IPX,WAN - X.25 1005
igs-fin-l         LANFrad 252x
c1005-qy-m        IP,WAN - X.25 w/Async 1005
c1005-nqy-m       IP,IPX,WAN - X.25 w/Async 1005
rsp-ajv-mz        Enterprise/APPN/VIP 7500
rsp-jv-mz         Enterprise/VIP 7500
rsp-pv-mz         Service Provider/VIP 75xx
rsp-dr-mz         Desktop/IBM 75xx
rsp-drv-mz        Desktop/IBM/VIP 75xx
rsp-i-mz          IP 75xx
rsp-iv-mz         IP/VIP 75xx
igs-inr2-l        IP/IPX/IBM(4MB) 25xx
c1005-xy2         IP/OSPF/PIM  1005
as5200-iz-l       IP w/managed modems 5200
as5200-dz-l       Desktop w/managed modems 5200
as5200-jm-l       Enterprise+RMON w/managed modems 5200
c7200-j-mz        Enterprise 7200
c7200-aj-mz       Enterprise+APPN 7200
c7200-dr-mz       Desktop/IBM 7200
c7200-inu-mz      Network Layer 3 Switching Software 7200
c3640-ainr-mz     IP/IPX/IBM/APPN 3640
c3640-aj-mz       Enterprise/APPN 3640
c3640-d-mz        Desktop 3640
c3640-dr-mz       Desktop/IBM 3640
c3640-i-mz        IP 3640
c3640-in-mz       IP/IPX 3640
c3640-inr-mz      IP/IPX/IBM 3640
c3640-ir-mz       IP/IBM 3640
c3640-j-mz        Enterprise 3640
c3640-p-mz        Service Provider 3640
c3620-ainr-mz     IP/IPX/IBM/APPN 3620
c3620-aj-mz       Enterprise/APPN 3620
c3620-d-mz        Desktop 3620
c3620-dr-mz       Desktop/IBM 3620
c3620-i-mz        IP 3620
c3620-in-mz       IP/IPX 3620
c3620-inr-mz      IP/IPX/IBM 3620
c3620-ir-mz       IP/IBM 3620
```

```
c3620-j-mz        Enterprise 3620
c3620-p-mz        Service Provider 3620
c1600-y-l         IP 1600
c1600-sy-l        IP/Plus 1600
c1600-ny-l        IP/IPX 1600
c1600-nsy-l       IP/IPX/Plus 1600
c1600-by-l        IP/AT 1600
c1600-bsy-l       IP/AT/Plus 1600
c1600-bny-l       IP/IPX/AT 1600
c1600-bnsy-l      IP/IPX/AT/Plus 1600
```

The following image names were added for Cisco IOS 11.2(1) and later:

```
c1000-bnsy-mz     1003/4
c1000-bnsy40-mz   1003/4
c1000-bnsy56-mz   1003/4

c1005-bnsy-mz     1005
c1005-bnsy40-mz   1005
c1005-bnsy56-mz   1005

c2500-ajs-l       25XX
c2500-ajs40-l     25XX
c2500-ajs56-l     25XX
c2500-ds-l        25XX,AP
c2500-ds40-l      25XX,AP
c2500-ds56-l      25XX,AP
c2500-is-l        25XX,AP
c2500-is40-l      25XX,AP
c2500-is56-l      25XX,AP
c2500-js40-l      25XX,AP
c2500-js56-l      25XX,AP

c4000-ajs-mz      4000
c4000-ajs40-mz    4000
c4000-ajs56-mz    4000
c4000-ds-mz       4000
c4000-ds40-mz     4000
c4000-ds56-mz     4000
c4000-is-mz       4000
c4000-is40-mz     4000
c4000-is56-mz     4000
c4000-js-mz       4000
c4000-js40-mz     4000
c4000-js56-mz     4000

c4500-ajs-mz      4500,4700
c4500-ajs40-mz    4500,4700
c4500-ajs56-mz    4500,4700
c4500-ds-mz       4500,4700
c4500-ds40-mz     4500,4700
c4500-ds56-mz     4500,4700
c4500-is-mz       4500,4700
c4500-is40-mz     4500,4700
c4500-is56-mz     4500,4700
c4500-js-mz       4500,4700
c4500-js40-mz     4500,4700
```

```
c4500-js56-mz       4500,4700

c5200-d-l           as5200
c5200-ds-l          as5200
c5200-i-l           as5200
c5200-is-l          as5200
c5200-j-l           as5200
c5200-js-l          as5200

c7000-p-mz          RP (70X0)

c7200-ads-mz        7200
c7200-is-mz         7200
c7200-p-mz          7200

rsp-adsv-mz         RSP(75XX)
rsp-ajsv40-mz       RSP(75XX)
rsp-ajsv56-mz       RSP(75XX)
rsp-dsv-mz          RSP(75XX)
rsp-dsv40-mz        RSP(75XX)
rsp-dsv56-mz        RSP(75XX)
rsp-isv-mz          RSP(75XX)
rsp-isv40-mz        RSP(75XX)
rsp-isv56-mz        RSP(75XX)
rsp-jsv40-mz        RSP(75XX)
rsp-jsv56-mz        RSP(75XX)
rsp-p-mz            RSP(75XX)
```

The following image names were added for Cisco IOS 11.1(9) and 11.2(4)M/P/F and later:

```
igs-f2in-l          25XX
c2500-f2in-l        25XX
```

The following image names were added for Cisco IOS 11.2(4)P/F and later:

```
c3800-ainr-mz       3800
c3800-f-mz          3800
c3800-j-mz          3800
```

The following image names were added for Cisco IOS 11.2(4)F and later:

```
c1000-l-mz          1000
c1000-lo-mz         1000
c1005-lx-mz         1005
c1005-lox-mz        1005
c1005-lq2-mz        1005
c2500-de-l          25XX
c2500-des-l         25XX
c2500-des40-l       25XX
c2500-des56-l       25XX
c1000-y3-mz         1000 IP/X.31 for X25 over ISDN D channel
```

The following image names were added for Cisco IOS 11.2(5)P/F later:

```
c3800-fin-mz        3800
c3800-i-mz          3800
c3800-ajs-mz        3800

c1600-y-l           1600
c1600-sy-l          1600
c1600-sy40-l        1600
c1600-sy56-l        1600
c1600-by-l          1600
c1600-bsy-l         1600
c1600-bsy40-l       1600
c1600-bsy56-l       1600
c1600-ny-l          1600
c1600-nsy-l         1600
c1600-nsy40-l       1600
c1600-nsy56-l       1600
c1600-bny-l         1600
c1600-bnsy-l        1600
c1600-bnsy40-l      1600
c1600-bnsy56-l      1600

c3620-ainr-mz       3620
c3620-ajs-mz
c3620-d-mz
c3620-ds-mz
c3620-i-mz
c3620-is-mz
c3620-j-mz
c3620-js-mz
c3620-p-mz

c3640-ainr-mz       3640
c3640-ajs-mz
c3640-d-mz
c3640-ds-mz
c3640-i-mz
c3640-is-mz
c3640-j-mz
c3640-js-mz
c3640-p-mz
```

The following image names were added for Cisco IOS 11.2(6) and later:

```
c5200-p3-l          Service Provider image for 5200
```

The following image names were added for Cisco IOS 11.2(6)P/F and later:

```
ls1010-wp-mz          Lightstream 1010

c25fx-f-l             Fixed Frad platform, frad image
c25fx-fin-l           Fixed Frad platform, LanFrad image
c25fx-f2in-l          Fixed Frad platform, OSPF Lanfrad image
```

The following image names were added for Cisco IOS 11.2(7)P/F and later:

```
c2800-m-mx            2800

c5rsm-i-mz            Cat 5K rsp IP image
c5rsm-d-mz            Cat 5K rsp desktop image

c7200-ajs40-mz        7200
c7200-ajs56-mz        7200
c7200-is40-mz         7200
c7200-is56-mz         7200
c7200-ds40-mz         7200
c7200-ds56-mz         7200
c7200-js40-mz         7200
c7200-js56-mz         7200

c3800-ainr-mz         3801
c3800-f-mz            3801
c3800-j-mz            3801
c3800-fin-mz          3801
```

The following image names were added for Cisco IOS 11.2(8)P and later:

```
c7200-ads40-mz    7200
c7200-ads56-mz    7200

c1600-nr2y-l      1600
c1600-nr2sy-l     1600
c1600-nr2sy40-l   1600
c1600-nr2sy56-l   1600

rsp-itv-mz        7500
```

The following image names were added for Cisco IOS 11.2(9)P/11.3 and later:

```
c1600-y-mz        1605
c1600-sy-mz       1605
c1600-sy40-mz     1605
c1600-sy56-mz     1605
c1600-by-mz       1605
c1600-bsy40-mz    1605
c1600-bsy56-mz    1605
c1600-bsy-mz      1605
c1600-ny-mz       1605
c1600-nsy-mz      1605
c1600-nsy40-mz    1605
c1600-nsy56-mz    1605
c1600-bny-mz      1605
```

```
c1600-bnsy-mz      1605
c1600-bnsy40-mz    1605
c1600-bnsy56-mz    1605
c1600-nr2y-mz      1605
c1600-nr2sy-mz     1605
c1600-nr2sy40-mz   1605
c1600-nr2sy56-mz   1605


c5rsm-jsv-mz       Cat5K
c5rsm-isv-mz       Cat5K
c5rsm-dsv-mz       Cat5K
c5rsm-dsv40-mz     Cat5K (encryption images are for testing only)
c5rsm-dsv56-mz     Cat5K
c5rsm-jsv40-mz     Cat5K (encryption images are for testing only)
c5rsm-jsv56-mz     Cat5K
c5rsm-isv40-mz     Cat5K (encryption images are for testing only)
c5rsm-isv56-mz     Cat5K


c3620-inu-mz       3620
c3640-inu-mz       3640
c4000-inu-mz       4000 (for testing purposes only in 11.2P)
c4500-inu-mz       4500
```

The following images were added in Cisco IOS 11.2(9)GS and 11.3 and later:

```
gsr-p-mz           GSR
gsr-diag-mz        GSR
```

The following images were added in Cisco IOS 11.2(10)P and later:

```
c5300-d-l          5300
c5300-i-l          5300
c5300-j-l          5300
c5300-ds-l         5300
c5300-is-l         5300
c5300-js-l         5300
c5300-p3-l         5300
```

The following images were added in Cisco IOS 11.3(1) and 11.3(1)P:

```
c1600-bnr2y-l      1600
c1600-bnr2sy-l     1600
c1600-bnr2sy40-l   1600
c1600-bnr2sy56-l   1600
```

The following images were added in Cisco IOS 11.3(1)MA:

```
mc3810-inr3-mz     3810
mc3810-a2inr3-mz   3810
mc3810-inr3v2-mz   3810
mc3810-a2inr3v2-mz 3810
```

The following image is added in Cisco IOS 11.3(2)T:

```
c2500-ai3r4-l
```

The following images are added in Cisco IOS 11.3(3)T:

```
c4500-aejs-mz
c4500-aejs40-mz
c4500-aejs56-mz

c7200-aejs-mz
c7200-aejs40-mz
c7200-aejs56-mz

rsp-aejsv-mz
rsp-aejsv40-mz
rsp-aejsv56-mz
```

The following are new board and router images are introduced in Cisco IOS 11.3AA:

```
dsc-c5800-mz
das-c5800-mz
c5800-p4-mz
c3640-c2is-mz
```

The following images were added for Cisco IOS 11.3(3)T:

```
c2600-i-mz
c2600-is-mz
c2600-c-mz
c2600-d-mz
c2600-ds-mz
c2600-js-mz
c2600-ajs-mz
c2600-p-mz

ubr7200-p-mz
```

XXXX-*56i-* All platforms 1600 and later have multiples of this image

The following images were added for Cisco IOS 11.3(2)NA:

```
c2500-ix-l
c3620-ix-mz
c3640-ix-mz
```

Cisco IOS feature sets are constantly added to the list. Consult CCO for the latest list of feature sets.