

Cisco MDS 9000 SAN-OS Software Reference Guide

Cisco® MDS 9000 SAN-OS Software is the operating system software for the Cisco MDS family of multilayer directors and fabric switches. It delivers intelligent storage networking features such as nondisruptive upgrades, multiprotocol integration, virtual storage area networks (VSANs), advanced traffic management, sophisticated diagnostics, stateful high availability, and unified SAN management. Cisco MDS 9000 SAN-OS Software provides an open platform for embedding intelligent storage applications from best-in-class partners.

Overview

A comprehensive Cisco MDS 9000 SAN-OS Software release methodology has been developed that not only preserves the integrity and stability of mission-critical storage networks, but also has the flexibility to respond to market needs for timely delivery of advanced storage networking features with multilayer intelligence.

This document is a guide to understanding the Cisco MDS 9000 SAN-OS Software release methodology. It describes the different types of releases, their functions, and their lifecycles with various scenarios. It also describes the Cisco MDS 9000 SAN-OS Software release and image naming conventions.

Types of Cisco MDS 9000 SAN-OS Software Releases

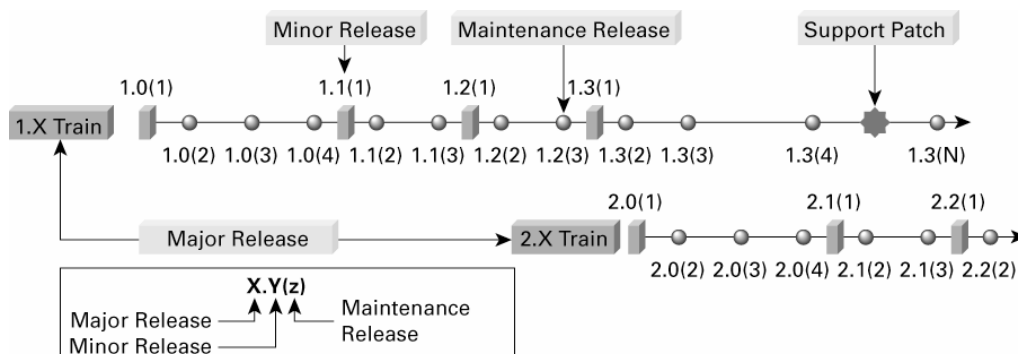
Table 1 lists the Cisco MDS 9000 SAN-OS Software release variants: major releases, minor releases, maintenance releases, and support patches.

Table 1. Cisco MDS 9000 SAN-OS Software Release Types

Cisco MDS 9000 SAN-OS Software Release Type	Description
Major release	A major release introduces significant new features, functions, or platforms.
Minor release	Each major release consists of multiple minor releases. Each minor release enhances a major release.
Maintenance release	A maintenance release primarily resolves product defects in a minor release. Helping ensure that each maintenance release addresses product defects preserves the integrity and stability of a minor release. Few or no new features are added in a maintenance release.
Support patch	Support patches address critical, service-affecting product defects.

Each Cisco MDS 9000 SAN-OS Software release is uniquely numbered as X.Y(z) where X is the major release, Y is a minor release that enhances major release X, and z is a maintenance release that addresses product defects in minor release Y. Figure 1 shows an example of how Cisco MDS 9000 SAN-OS Software releases are numbered.

Figure 1. Cisco MDS 9000 SAN-OS Software Release Numbering



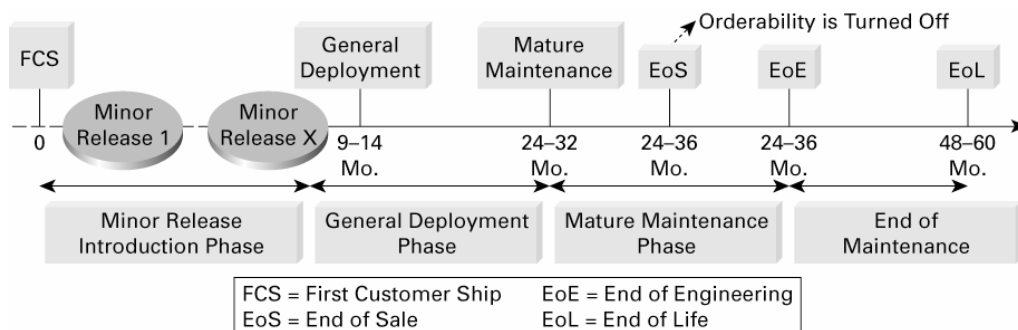
Lifecycle of a Cisco MDS 9000 SAN-OS Software Release

The lifecycle of a major release spans several minor and maintenance releases.

Lifecycle of a Major Release

Figure 2 illustrates the lifecycle of a major release. For simplification, the maintenance releases are not shown.

Figure 2. Cisco MDS 9000 SAN-OS Software Major Release Lifecycle



The lifecycle of a major release starts with the first customer ship (FCS) of the first minor release. It represents the date of the first shipment of a software release to customers for revenue. A major release usually occurs every 12 to 16 months.

The major release then enters the minor release introduction phase, where several minor and maintenance releases are released to enhance functioning and address product defects, respectively. The lifecycle of a minor release is described in the next section.

After the integrity and stability of the final minor release is established, the major release achieves general deployment status. General deployment status indicates that the major release has been proven with extensive market exposure in diverse deployment scenarios and has passed rigorous metrics analyzing stability and bug trends. No new features or functions are added to the major release after it achieves general deployment status. The general deployment phase lasts for 18 to 24 months, and product defects in this phase are addressed in maintenance releases.

After the general deployment phase, the major release transitions into the mature maintenance phase. In this phase, the release receives defect repairs only for severity 1 and severity 2 defects that the customer finds. Problems found internally are addressed on a case-by-case basis.

During the mature maintenance phase, the major release reaches the end-of-sale (EoS) milestone, which represents the last date for product orderability through Cisco customer service or manufacturing. The product will still be available through Cisco field support offices and Cisco.com.

After the EoS milestone, the major release achieves end-of-engineering (EoE) status, which represents the last scheduled maintenance revision of the major release. Engineering will no longer actively apply any defect repairs to the release, regardless of origin or severity (except for security defects). The product will still be available through Cisco field support offices and Cisco.com.

Finally, the major release reaches end-of-life (EoL) status, where the software image is no longer supported by Cisco and is removed from Cisco.com.

Cisco will generally provide a 6-month notice of a product's EoS date or the last day when the affected product can be ordered. This notice will appear on Cisco.com at http://www.cisco.com/en/US/products/prod_end_of_life.html.

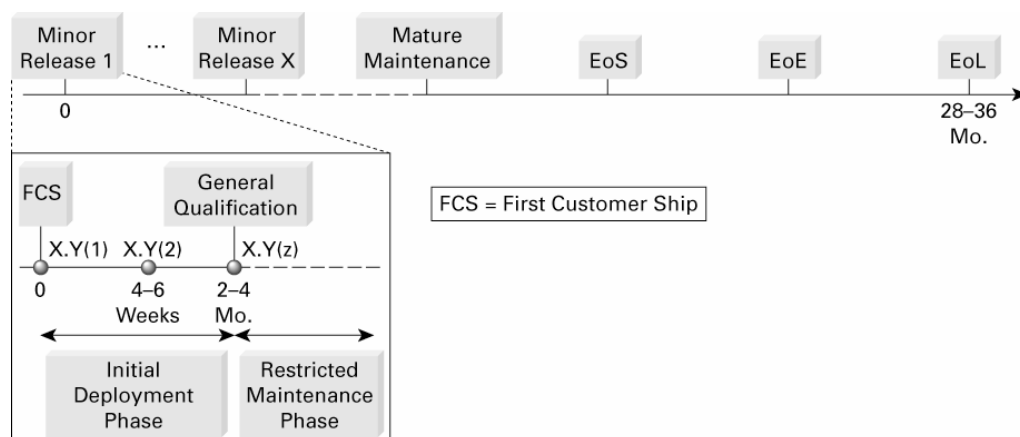
You are encouraged to visit this site regularly—it contains useful information regarding the Cisco EoL program. Access to the Cisco Technical Assistance Center (TAC) is available 24 hours a day, 7 days a week, for a period of 5 years from the EoS date for Cisco MDS 9000 SAN-OS Software concerns.

Lifecycle of a Minor Release

Figure 3 illustrates the lifecycle of a minor release. After FCS of each minor release, there is an initial deployment phase in which product defects are addressed in maintenance releases every 4 to 6 weeks.

To preserve the integrity, stability, and quality of a minor release, maintenance releases primarily address product defects. Few or no new features or functions, which can be potentially destabilizing, are added to the maintenance release.

Figure 3. Cisco MDS 9000 SAN-OS Software Minor Release Lifecycle

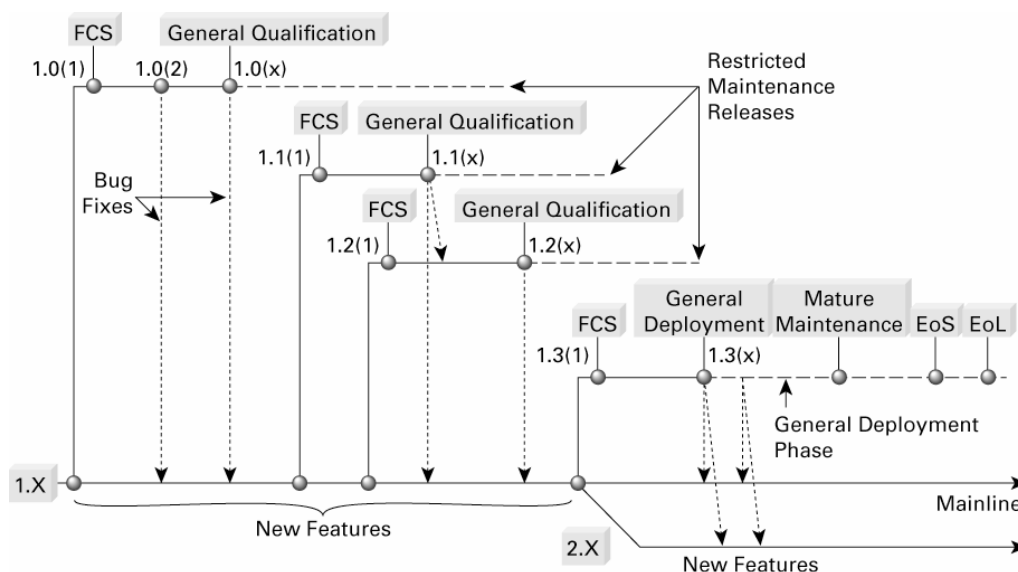


A minor release achieves generally qualified status after it is qualified and quantified with metrics. Minor releases are analyzed for integrity, stability, and bug trends and are proven through extensive qualification testing and exposure in diverse storage networks.

After achieving generally qualified status, the minor release transitions into the restricted maintenance phase. During this phase, only critical, pervasive, and service-affecting severity 1 and severity 2 product defects are addressed. All other types of defects are addressed by upgrading to another minor release. These types of scenarios are described in the next section, along with recommendations.

Figure 4 shows the evolution of major, minor, and maintenance Cisco MDS 9000 SAN-OS Software releases.

Figure 4. Evolution of Cisco MDS 9000 SAN-OS Software Major, Minor, and Maintenance Releases



Cisco MDS 9000 SAN-OS Software Release Management Scenarios

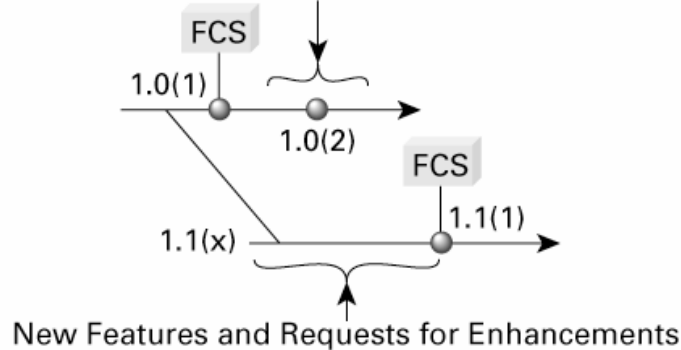
This section describes the Cisco MDS 9000 SAN-OS Software release methodology using examples.

Integrity and Stability of a Release

Because all post-FCS activity in Cisco MDS 9000 SAN-OS Software Release 1.0(1) is addressing only product defects (Figure 5), the integrity and stability of this release is preserved. New features and requests for enhancements will be addressed in a subsequent minor release, which in this scenario is 1.1(1).

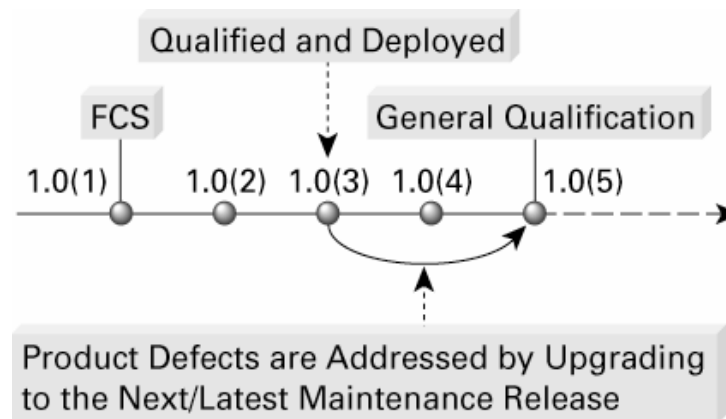
Figure 5. Integrity and Stability of a Release

Addresses Product Defects Only. No New Features.



Product Defects in Initial Deployment Phase

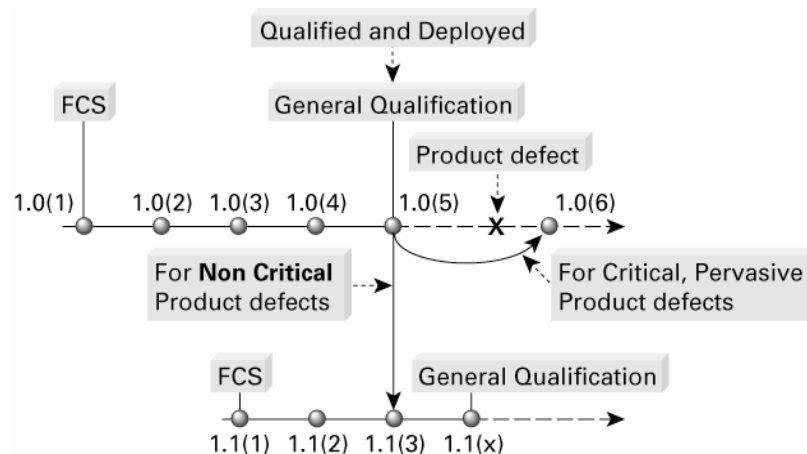
During the initial deployment phase, the product defects in the Cisco MDS 9000 SAN-OS Software Release 1.0(x) are addressed in maintenance releases 1.0(2) and 1.0(3), occurring every 4 to 6 weeks, with Cisco MDS 9000 SAN-OS Software Release 1.0(5) achieving generally qualified status (Figure 6).

Figure 6. Initial Deployment Phase

Now, a fabric running an older maintenance release [Cisco MDS 9000 SAN-OS Software Release 1.0(3)] encounters a known product defect that has already been addressed in Cisco MDS 9000 SAN-OS Software Release 1.0(5). By upgrading to Cisco MDS 9000 SAN-OS Software Release 1.0(5), the fabric can realize the benefit of receiving updates for all known product defects. Because the maintenance release Cisco MDS 9000 SAN-OS Software Release 1.0(5) addresses product defects and is fully regression tested for all features and functions, the integrity, stability, and quality of the minor release Cisco MDS 9000 SAN-OS Software Release 1.0(x) is preserved.

Product Defects in the Restricted Maintenance Phase

Cisco MDS 9000 SAN-OS Software Release 1.0(x) progresses to maintenance release Cisco MDS 9000 SAN-OS Software Release 1.0(5), where it achieves generally qualified status and transitions into the restricted maintenance phase. If a fabric running maintenance release Cisco MDS 9000 SAN-OS Software Release 1.0(5) encounters a product defect in this phase, there are two mechanisms to address the issue (Figure 7) depending on the severity of the defect.

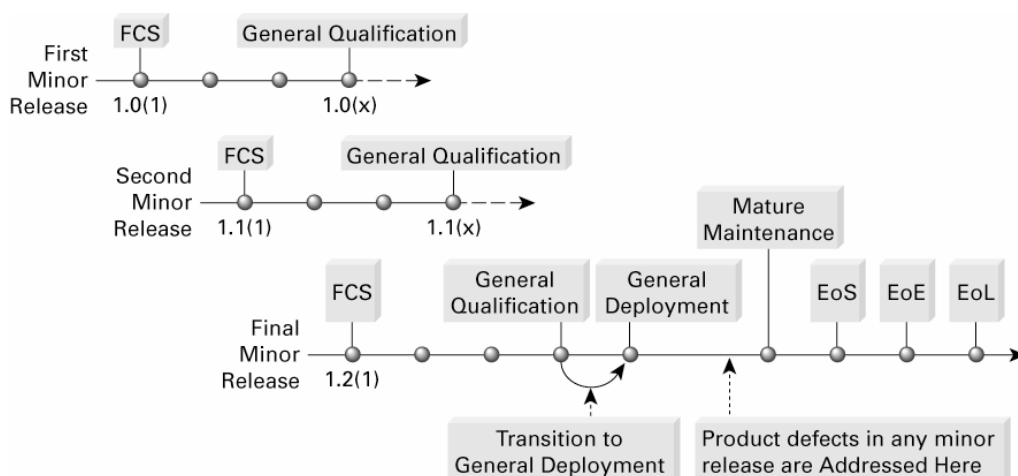
Figure 7. Restricted Maintenance Phase

For a critical product defect that is pervasive, a new maintenance release [Cisco MDS 9000 SAN-OS Software Release 1.0(6)] is introduced. This is the *only* exception scenario where a maintenance release is introduced after the generally qualified phase.

For a noncritical product defect, a fabric upgrade to the next minor release [Cisco MDS 9000 SAN-OS Software Release 1.1(3)] should be planned. With this planned upgrade, the fabric gets the benefit of an update for all other product defects. Noncritical product defects are not addressed in the restricted maintenance phase of a minor release. Even though the next minor release introduces new features, the comprehensive regression testing process that Cisco uses ensures that the integrity, stability, and quality of Cisco MDS 9000 SAN-OS Software Release 1.1(3) is preserved with the new features.

Transition to General Deployment Status

Major release 1.0 has three minor releases 1.0(x), 1.1(x), and 1.2(x) (Figure 8). The major release achieves general deployment status when the final minor release (1.2(x) in this example) transitions to generally qualified status. As described in the previous sections, general deployment status indicates the end of new features and functions in the major release. Additionally, general deployment status indicates that the major release has been proven with extensive market exposure in diverse deployment scenarios and has passed rigorous metrics analyzing stability and bug trends. Product defects (if any) during the general deployment phase are addressed in maintenance releases.

Figure 8. Transition to General Deployment Status

Cisco MDS 9000 SAN-OS Software Image Naming Conventions

Each Cisco MDS 9000 SAN-OS Software release can consist of up to two images: *kickstart* and *system*. The kickstart image provides kernel services for the Cisco MDS 9000 family platform, whereas the system image consists of the software that provides intelligent, multilayer storage networking features. A Cisco MDS 9000 SAN-OS Software release does not require both kickstart and system images. For example, a Cisco MDS 9000 SAN-OS Software release will not have a kickstart image if there is no change to the kernel. A compatibility matrix with versions of kickstart and system images is posted on Cisco.com.

The image names use this convention:

(Platform)-(Supervisor Series)(Features)-(Image Type)-(Attributes)-(Version).(Extension)

The variable names and their values are listed in Table 2.

Table 2. Cisco MDS 9000 SAN-OS Software Variables

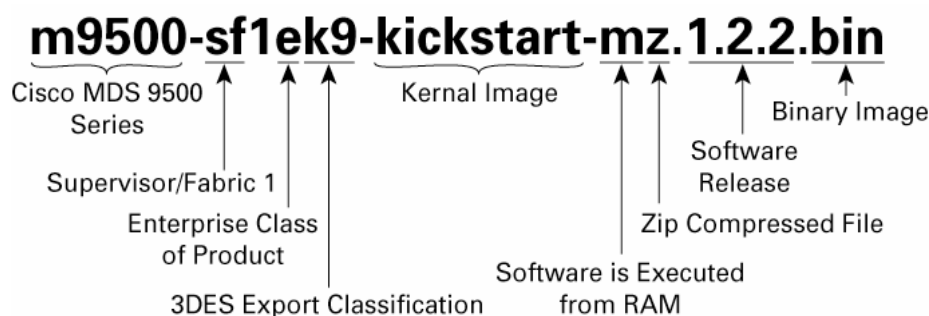
	Type Designator	Description
Platform series	m9500	Cisco MDS 9500 Series Multilayer Directors
	m9200	Cisco MDS 9200 Series Multilayer Fabric Switches
	m9100	Cisco MDS 9100 Series Multilayer Fabric Switches
	m9000	Cisco MDS 9000 family
Supervisor family	sf1	sf1: Supervisor fabric software for Cisco MDS 9500 Series Multilayer Directors with the supervisor 1 module (DS-X9530-SF1-K9); nothing is specified for Cisco 9200 Series
	sf2	sf2: Supervisor fabric software for Cisco MDS 9500 Series Multilayer Directors with the supervisor 2 module (DS-X9530-SF2-K9)
	s1	s1: Supervisor software for Cisco MDS 9120 and MDS 9140 Multilayer Fabric Switches
	s2	s2: Supervisor software for Cisco MDS 9100 Series, except for Cisco MDS 9120 and MDS 9140
Features	ek9	e: Enterprise class of products; k9: Export classification for encryption
Image type	kickstart	Specifies the kernel (required only for kernel); for the system image, nothing is specified
	epld	epld: Cisco MDS 9000 Erasable Programmable Logic Device (EPLD) image
	fm	fm: Cisco MDS 9000 Fabric Manager
	asm-sfn	asm-sfn: Cisco MDS 9000 Advanced Services Module–VERITAS Storage Foundation™ for Networks

	csm-svc	csm-svc: Cisco MDS 9000 Caching Services Module–IBM TotalStorage SAN Volume Controller Storage Software
	ssi	ssi: Storage Services Interface software
Attributes	m, f, r, l	m: DRAM; f: Flash. r: ROM; l: Image can be relocated
	z, x	z: Zip compressed; x: Mzip compressed
	g	g: GNV debugger (GDB) image
Version	Same as software release number	The first release will be Cisco MDS 9000 SAN-OS Software Release 1.0(1), for example
Extension	bin	bin: Binary images
	img	img: Firmware images
	jar	jar: Java archives

Cisco MDS 9500 Series Image Naming Examples

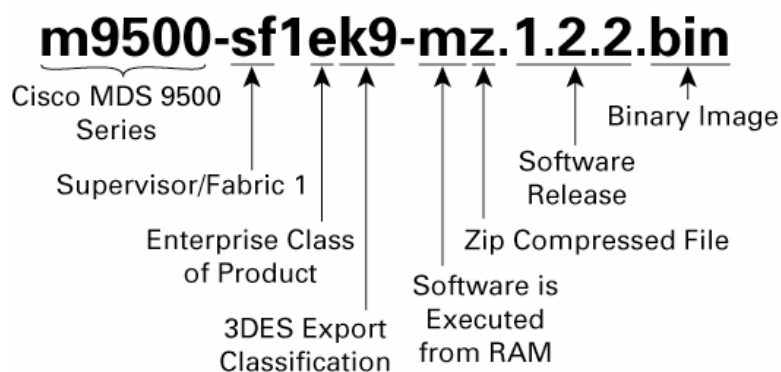
The kickstart image name for Cisco MDS 9500 Series Multilayer Directors for Cisco MDS 9000 SAN-OS Software Release 1.2(2) is shown in Figure 9.

Figure 9. Cisco MDS 9500 Series Kickstart Naming Example



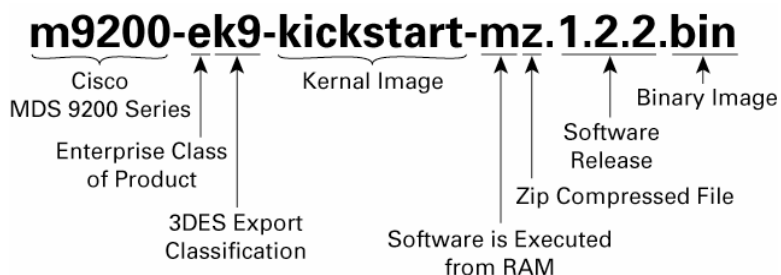
The system image name for Cisco MDS 9500 Series Multilayer Directors for Cisco MDS 9000 SAN-OS Software Release 1.2(2) is shown in Figure 10.

Figure 10. Cisco MDS 9500 Series System Naming Example

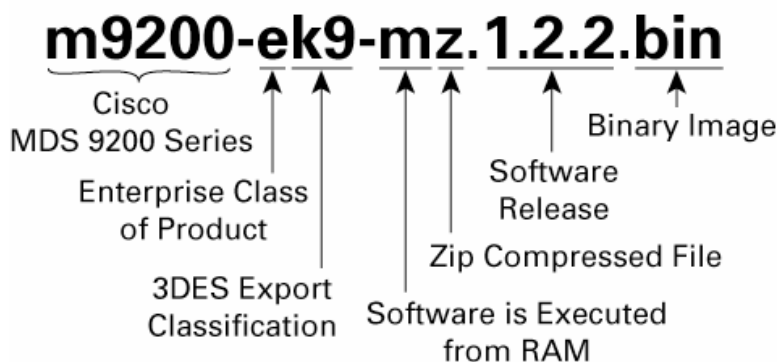


Cisco MDS 9200 Series Image Naming Examples

The kickstart image name for Cisco MDS 9200 Series Fabric Switches for Cisco MDS 9000 SAN-OS Software Release 1.2(2) is shown in Figure 11.

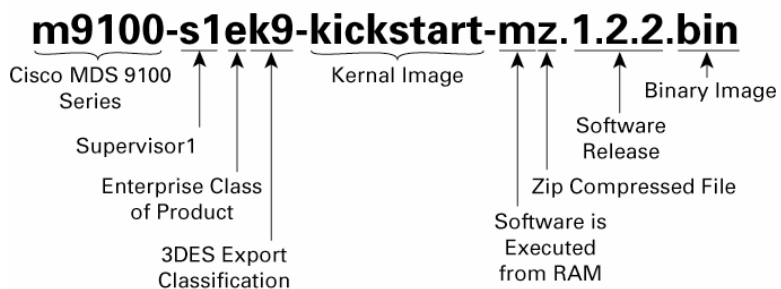
Figure 11. Cisco MDS 9200 Series Kickstart Naming Example

The system image name for Cisco MDS 9200 Series Fabric Switches for Cisco MDS 9000 SAN-OS Software Release 1.2(2) is shown in Figure 12.

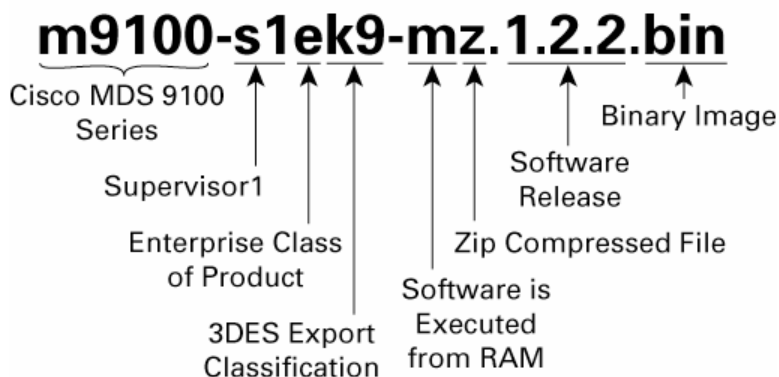
Figure 12. Cisco MDS 9200 Series System Naming Example

Cisco MDS 9100 Series Image Naming Examples

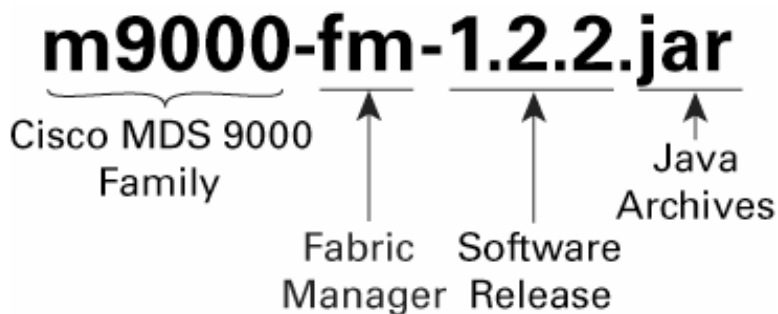
The kickstart image name for Cisco MDS 9100 Series Fabric Switches for Cisco MDS 9000 SAN-OS Software Release 1.2(2) is shown in Figure 13.

Figure 13. Cisco MDS 9100 Series Kickstart Naming Example

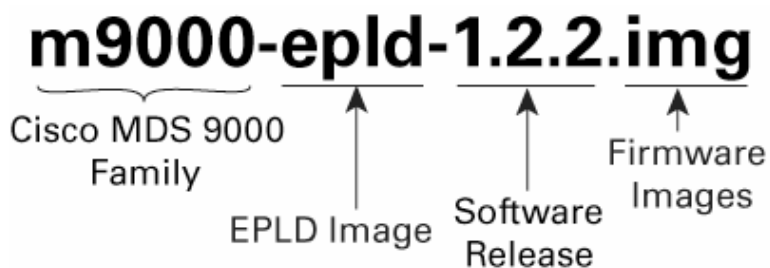
The system image name for Cisco MDS 9100 Series Fabric Switches for Cisco MDS 9000 SAN-OS Software Release 1.2(2) is shown in Figure 14.

Figure 14. Cisco MDS 9100 Series System Naming Example**Cisco MDS 9000 Fabric Manager Naming Example**

The Cisco MDS 9000 Fabric Manager standalone installation file name for Cisco MDS 9000 SAN-OS Software Release 1.2(2) is shown in Figure 15.

Figure 15. Cisco MDS 9000 Fabric Manager Naming Example**Cisco MDS 9000 EPLD Image Naming Example**

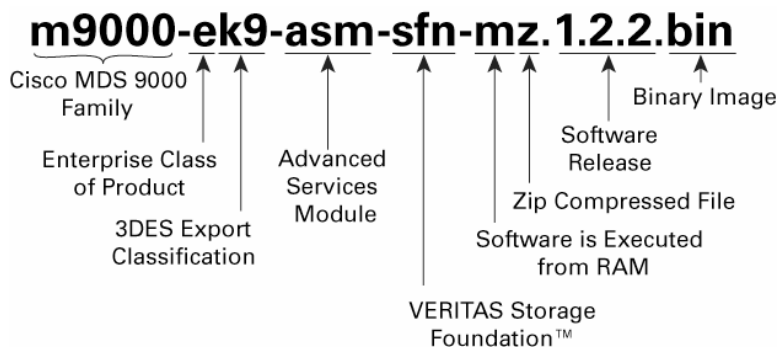
The Cisco MDS 9000 EPLD image file Release 1.2(2) name is shown in Figure 16.

Figure 16. Cisco MDS 9000 EPLD Image Naming Example

Cisco MDS 9000 Advanced Services Module Naming Example

The image name for Cisco MDS 9000 Advanced Services Module–VERITAS Storage Foundation for Networks for Cisco MDS 9000 SAN-OS Software Release 1.2(2) is shown in Figure 17.

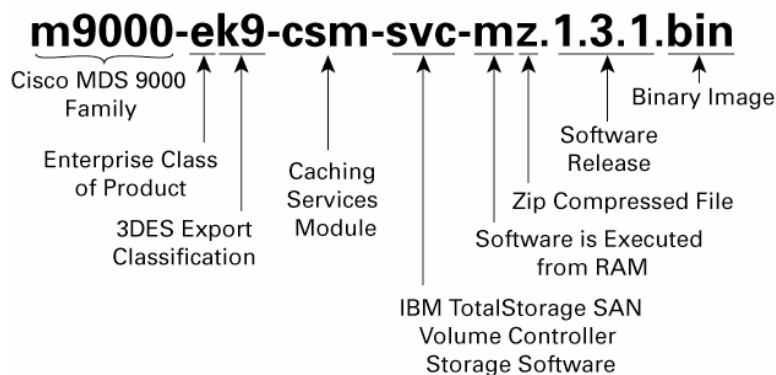
Figure 17. Cisco MDS 9000 Advanced Services Module Naming Example



Cisco MDS 9000 Caching Services Module Naming Example

The image name for Cisco MDS 9000 Caching Services Module–IBM TotalStorage SAN Volume Controller Storage Software for Cisco MDS 9000 SAN-OS Software Release 1.3(1) is shown in Figure 18.

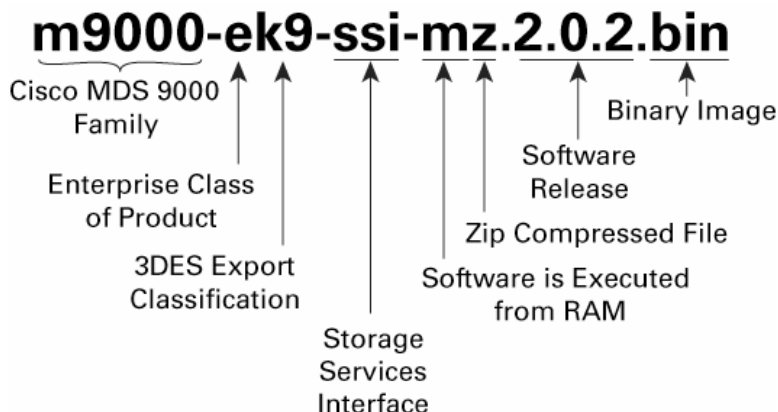
Figure 18. Cisco MDS 9000 Caching Services Module Naming Example



Cisco MDS 9000 Storage Services Interface Naming Example

The image name for Cisco MDS 9000 Storage Services Interface software for Cisco MDS 9000 SAN-OS Software Release 2.0(2) is shown in Figure 19.

Figure 19. Cisco MDS 9000 Storage Services Interface Naming Example



Summary

Cisco MDS 9000 SAN-OS Software release methodology preserves the integrity, stability, and quality of customers' mission-critical storage networks. It has the flexibility to respond to market needs for timely delivery of innovative features. Primary attributes of release methodology include the following:

- Major releases introduce significant new features, functions, and platforms.
- Minor releases enhance the features and functions of an existing major release.
- Maintenance releases address product defects in a minor release.



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