

# Guidelines for Cisco IOS XR Software

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## Introduction

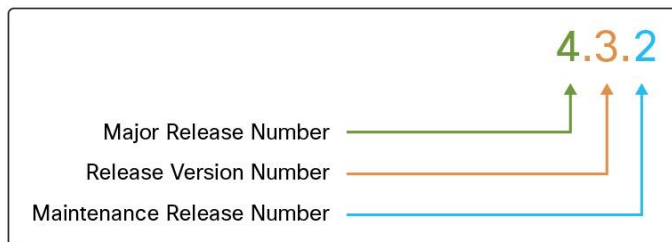
This document explains the Cisco IOS<sup>®</sup> XR Software time-based release model and answers some common questions, such as linkage between release age and Software Maintenance Unit (SMU) policy.

## Types of Software Releases

The Cisco IOS XR Software model has three types of software releases. Each release type has its own content scope and release frequency. Two types are time-based, full-code releases (standard and extended maintenance releases), and the third is a mechanism (the SMU) to deploy asynchronous software patches.

The examples in these guidelines use the X.X.X format for release version numbers, for example 4.1.1 (Figure 1).

**Figure 1.** Cisco IOS XR Software Release Numbering: X.X.X Format



## Feature Release

Cisco IOS XR Software feature releases ( $X_1.X_2.X_3$ ) are signified by a change to either the first digit ( $X_1$ ) or the second digit ( $X_2$ ) in the release version number (for example, the 4 in Cisco IOS XR Software Release 4.0.0 or the 1 in Cisco IOS XR Software Release 4.1.0). In general, a change to  $X_1$  would indicate a larger change, such as a change in architecture or the addition of a platform.

Feature releases are delivered for one or more of the following reasons:

- Likely to cause a change to  $X_1$ :
  - Introduce significant changes throughout the software, including infrastructure or architectural changes.
  - Introduce support for a new hardware platform family. For example, Cisco IOS XR Software Release 2.0.0 introduced the Cisco<sup>®</sup> CRS-16 Carrier Routing System platform. Release 3.0.0 introduced the Cisco CRS-1 8-Slot Line Card Chassis. A Cisco IOS XR Software feature release is governed by the software lifecycle policy in the section “Lifecycle of Cisco IOS XR Software Releases”.
- Likely to cause a change to  $X_2$ :
  - New functions and features: For example, Release 3.3.0 introduced Layer 3 VPN (L3VPN) functions, and Release 3.4.0 introduced L2VPN capability.

- Bug fixes and enhancements to existing functions introduced in a previous feature release: For example, Release 3.4.0 also enhanced L3VPN capability by supporting inter-autonomous system (Inter-AS) and Carrier Supporting Carrier (CSC) functions.

Feature releases are delivered approximately every 8 months. Cisco may alter the frequency of this release interval upon customers' feedback and market conditions in the future, but every attempt is made to maintain a time-based release. A Cisco IOS XR Software feature release is governed by the software lifecycle policy in the section "Lifecycle of Cisco IOS XR Software Releases".

The list of critical bug fixes and features added to a feature release is provided in the release notes along with installation instructions and dependencies. Cisco announces new feature releases by posting a product bulletin on Cisco.com. The software images are available for download at the Cisco.com Software Center. Please note that certain features may require the purchase of an additional license.

### Maintenance Release

A Cisco IOS XR Software maintenance release is signified by the third digit in the release version number (for example, the 2 in Cisco IOS XR Software Release 3.9.2). As a matter of course, releases X.X.0 and X.X.1 could contain major features, whereas X.X.2, in special cases approved by Cisco, would contain minor features and enhancements to existing functions or features begun in the X<sub>1</sub> or X<sub>2</sub> release. Release X.X.3 and later would generally contain only bug fixes.

Maintenance releases are the primary mechanism to deliver critical bug fixes to Cisco IOS XR Software feature releases. A Cisco IOS XR Software maintenance release is signified by the third digit in the release version number (for example, the 2 in Cisco IOS XR Software Release 3.9.2). Maintenance releases are delivered approximately every 4 months. Cisco may alter the frequency of this release interval upon customers' feedback and market conditions in the future, but every attempt is made to maintain a time-based release. A Cisco IOS XR Software maintenance release is governed by the software lifecycle policy in the section "Lifecycle of Cisco IOS XR Software Releases".

### Release Support Timeline

Cisco provides primary software maintenance support on an X.X.0, X.X.1, or X.X.2 release for 24 months after the X.X release is introduced. These releases are referred to as standard maintenance releases (SMRs). The last maintenance release, X.X.3, is an extended maintenance release (EMR) and has software maintenance support for 36 months from when the X.X.0 release is posted. Cisco reserves the right to deviate from this policy of numeration and SMR or EMR designation in rare occasions, which are documented in this bulletin (Table 1).

**Table 1.** Current Feature Release SMR and EMR

Software Feature Release	4.3	5.0	5.1	5.2	5.3	6.0	6.1
<b>SMR</b> (24 months)	4.3.0 4.3.1 4.3.2 (ASR 9000 only)	5.0.0 (NCS 6000 only, not GA)	5.1.0 (CRS and ASR 9000 only) 5.1.1 (CRS, ASR 9000 and XRv only) 5.1.2 (CRS and ASR 9000 only)	5.2.0 (CRS and ASR 9000 only) 5.2.1 (NCS 6000 only) 5.2.2 (CRS, ASR 9000 and XRv only) 5.2.3 (NCS 6000 only) 5.2.4	5.3.0 (CRS, ASR 9000 and XRv only) 5.3.1 (CRS, ASR 9000 and XRv only) 5.3.2 (CRS and ASR 9000 only)	6.0.1 (ASR 9000 and XRv 9K only) 6.0.2 (ASR 9000, XRv 9K, NCS 5500 and NCS 4000 only)	6.1.2 (CRS, ASR 9000, XRv 9K, NCS 6000, NCS 5500, NCS 5000 and NCS 1000 only)

Software Feature Release	4.3	5.0	5.1	5.2	5.3	6.0	6.1
<b>EMR</b> (36 months)	4.3.2 (CRS only) 4.3.4 (ASR 9000 only)	5.0.1 (NCS 6000 only)	5.1.3 (CRS and ASR 9000 only)	5.2.5 (NCS 6000 only)	5.3.3 (CRS and ASR 9000 only) 5.3.4 (CRS, ASR 9000 and XRv only)		

Software maintenance support will provide customers with routine maintenance releases as well as point bug fixes as explained in the section “SMU”. Cisco continues to provide technical assistance support for Cisco IOS XR feature releases through the Cisco Technical Assistance Center (TAC), until they reach the end of life, governed by the software lifecycle policy explained in the section “Lifecycle of Cisco IOS XR Software Releases”.

At present, two to three maintenance releases are planned for each feature release. A planned maintenance release is provided approximately once every 4 months after the initial feature release. Representatives from Cisco TAC and Cisco Engineering evaluate the priority of bug fixes and determine the ones that should be included in each maintenance release. Cisco encourages Cisco IOS XR Software customers to include maintenance releases in their software maintenance plan to avoid possible operational effects from known software bugs.

The list of critical bug fixes in a maintenance release is provided in the release notes along with installation instructions and dependencies. Maintenance releases are cumulative for the feature release they support. At the time it is published, the latest maintenance release includes all critical fixes published since the feature release was introduced. Cisco encourages all Cisco IOS XR Software customers to actively migrate to the latest maintenance release at their earliest convenience. If a bug is encountered that has been fixed in a maintenance release, the Cisco support policy is to recommend an upgrade to the latest available maintenance release.

## SMU

A Software Maintenance Unit is a point fix provided between regular maintenance releases or between the final maintenance release and the end of maintenance (EoM) of the feature release with the exception of the Cisco Product Security Incident Response Team (PSIRT) SMU. EoM PSIRT SMU is supported for an additional 24 months after the EoM because these address security concerns (see PSIRT definition in SMU section). Customer SMUs are typically confined to a limited number of software components and are intended to be simple fixes. SMUs are not intended to deliver new features and they are not a replacement for maintenance releases. The effect of a SMU and its installation procedure is documented in the release note that accompanies the SMU.

Cisco does not produce SMUs for every software bug fix. We evaluate each bug fix against several criteria to be considered a candidate for a possible SMU release. In general, a bug fix must satisfy one or more of the following criteria to be considered as a candidate:

- The bug fix repairs critical problems that cause a network outage or affect live network deployment.
- The Cisco PSIRT team or Cisco Engineering recommends a SMU.
- No near-term maintenance release is available to include the fix: If no viable operational workaround exists, SMU requests are assigned a priority P1 or P2.
- P1 SMUs address bugs that affect the network or Cisco PSIRT and include a 24-hour response time for initial evaluation.
- P2 priority SMU requests affect neither the Cisco PSIRT nor the network. These SMUs are evaluated over a 2-week time period. Please note that this time period is not the response time for delivering a fix. It is indicative of the speed of initial response to investigate the viability of a SMU.

## Types of SMUs

### Production SMU

Production SMUs are supported until end of maintenance of the feature release, which is 24 months after the X.X release for X.X.0, X.X.1, and X.X.2 releases and 36 months for X.X.3 releases. Production SMUs are provided to fix bugs that affect live network deployment. Production SMUs are tested and certified prior to release and are fully supported by Cisco TAC. Individual SMUs reach their end-of-life milestone after the bug fix is integrated into a maintenance release.

### Cisco PSIRT SMU

Cisco Product Security Incident Response Team (PSIRT) SMUs are supported for 48 months after the initial feature release. PSIRT SMUs are provided in response to security-related problems and are released under guidance from the Cisco PSIRT in accordance with the Cisco Security Vulnerability Policy. Cisco PSIRT SMUs are typically built, tested, and delivered to all active software releases affected by the PSIRT problem. Cisco PSIRT SMUs are supported by Cisco TAC.

### SMU Delivery and Posting

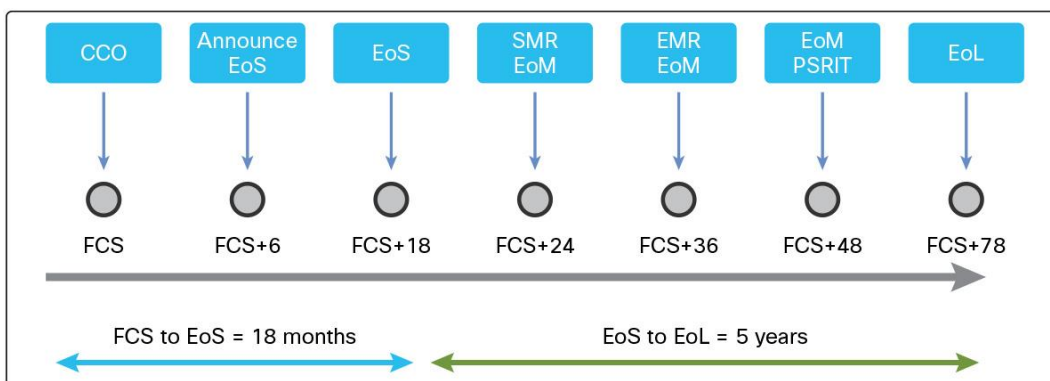
SMUs are posted on Cisco.com for download on the Cisco IOS XR Software Maintenance Upgrade download page. A list of recommended SMUs is available on the page. Each SMU is customized for a specific Cisco IOS XR Software release based on the affected customer's software. However, SMUs are not normally generated for all available software releases.

With the introduction of each release type and SMU operation policy, the following section describes the entire release lifecycle.

## Lifecycle of Cisco IOS XR Software Releases

Figure 2 illustrates primary milestones of a feature release lifecycle (X.X), including the end-of-sale announcement, the end of sale, the end of maintenance support, and the end of maintenance through migration timeframes.

**Figure 2.** Cisco IOS XR Software Feature Release Lifecycle (Not To Scale)



The entire lifecycle of any feature release is 6.5 years, which includes 18 months after the FCS date until the end-of-sale date of the feature release, plus 5 years starting from the end-of-sale date until the release end-of-life date. All maintenance releases of a particular feature release will share the same end-of-sale, end-of-maintenance, end-of-maintenance through migration, and end-of-life milestones.

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As described in the “Maintenance Release” section, Cisco provides software maintenance support on a feature release for 24 (X.X.0, 1, and 2) and 36 (X.X.3) months after an X.X release is introduced. Software maintenance support will provide customers with routine maintenance releases as well as point bug fixes through SMUs.

Bug dispositions for each phase follow:

- First customer shipment (FCS): The time at which the Cisco IOS XR Software feature release is posted on Cisco.com.
- CCO to announce end of sale: End-of-sale announcements generally occur 6 months after FCS of X.X.0 releases. Bugs found are evaluated by engineering and become candidates for following maintenance releases. If the bug meets SMU guidelines and is accepted, a SMU may be generated.
- Announcement of end of sale to end of sale: End of sale occurs 18 months after FCS of X.X.0 releases. Bugs found are evaluated by engineering and become candidates for following maintenance releases. If the bug meets SMU guidelines and is accepted, a SMU may be generated.
- End of sale to end of maintenance: End of maintenance occurs 24 to 36 months after FCS of X.X.0 releases. Bugs found are evaluated by engineering and become candidates for following maintenance releases. If the bug meets SMU guidelines and is accepted, a SMU may be generated.
- End of maintenance to end of maintenance PSIRT: End-of-maintenance PSIRT occurs 48 months after FCS of X.X.0 releases. Bugs found become candidates for following feature releases. If the bug is a PSIRT, a SMU is generated. However, no other SMUs will be generated. Problem resolution is through a different feature release.
- End of maintenance PSIRT to end of life: End of life is 78 months after FCS of X.X.0 releases. Bugs found become candidates for following feature releases. No SMUs will be generated. Problem resolution is through a different feature release.
- End of life: End of life is 78 months after FCS of X.X.0 releases. Calls to Cisco TAC will not be addressed for this release. TAC recommendation will be to upgrade to a currently supported release to validate whether the bug still exists.

Cisco continues to provide TAC support for Cisco IOS XR feature releases until they reach the end-of-life milestone in accordance with the published Cisco end-of-life policy. Please refer to [http://www.cisco.com/en/US/products/products\\_end-of-life\\_policy.html](http://www.cisco.com/en/US/products/products_end-of-life_policy.html) for more information.

## Upgrade Paths

Maintenance releases are cumulative for the feature release they support. At the time it is published, the latest maintenance release includes all critical fixes published since the feature release was introduced. Cisco encourages all Cisco IOS XR Software customers to actively migrate to the latest maintenance release at their earliest convenience. If a bug is encountered that has been fixed in a maintenance release, the company's support policy is to recommend an upgrade to the latest available maintenance release.

For the upgrade path of a feature release, customers may have unique requirements, and they are encouraged to work with local Cisco customer representatives to find the most optimal release for their network.

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## Customer Notifications

Cisco notifies customers of the lifecycle and major milestones of a particular release by the following methods:

- Release note and product bulletin: When a feature release is introduced, Cisco publishes a release note and a release product bulletin on Cisco.com for that particular feature release. In this document, the end-of-sale, end-of-maintenance, and end-of-life dates of that release are indicated.
- End-of-sale preannouncement: Twelve months before the end-of-sale date of the feature release, Cisco issues an official end-of-sale bulletin for the software release, which includes all end-of-sale milestones affected including end of maintenance and end of life.
- End-of-sale announcement: Three months before the end-of-sale date, Cisco updates the official end-of-sale announcement document with indication of end-of-sale milestones of all available maintenance releases for that particular feature release.

All of the documents are intended to provide advanced notification to Cisco IOS XR Software customers of the pending end-of-sale and end-of-life milestones.

## Cisco Services

Cisco offers a wide range of services programs to accelerate customer success. These innovative services programs are delivered through a unique combination of people, processes, tools, and partners, resulting in high levels of customer satisfaction. Cisco services help customers protect their network investments, optimize network operations, and prepare their networks for new applications to extend network intelligence and the power of their business.

## Summary

Cisco understands that our customers operate on disciplined, time-sensitive service-deployment operations with predictable qualification lead times. With the trend of convergence at application, service, and network toward a common packet-based infrastructure, the guidelines described in this document provide three types of software delivery methods designed to meet two fundamental requirements:

- Deliver features (including feature enhancements) in a timely manner: A given Cisco IOS XR Software feature must have consistent behavior on all supported Cisco IOS XR Software platforms.
- Fix problems found in deployed services.

Cisco IOS XR Software has defined multiple software release types to address the two fundamental requirements:

- Feature releases every 8 months (to introduce new software and hardware features and sometimes hardware platforms or software architecture changes)
- Maintenance releases every 4 months to cumulatively fix problems found
- SMUs to address on-demand point bug fixes

Cisco continuously improves the release and support practices based on customer needs and input. For any questions related to release practice or suggestions for improvements, please contact your local Cisco sales team.




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