

# Cisco IOS XE Software for Cisco ASR 1000 Series Routers

PB448387

This product bulletin describes the release plan for the Cisco IOS<sup>®</sup> XE Software images for Cisco<sup>®</sup> ASR 1000 Series Aggregation Services Routers.

For the introduction of Cisco IOS XE Software for the Cisco ASR 1000 Series, Cisco is using a release plan that provides an optimized and predictable way to deliver software and hardware features in a time-based release sequence. Cisco IOS XE Software is a modular operating system built on a Linux kernel. An included software module, derived from the Cisco IOS Software Release 12.2 SR release train, is provided to incorporate Cisco IOS Software features into a Cisco IOS XE Software release image. Cisco selects specific features and other code from the Cisco IOS Software 12.2 SR release train for inclusion in Cisco IOS XE Software. Through this release plan, and through careful selection of the Cisco IOS Software features being introduced, Cisco IOS XE Software releases offer greater stability and shorter qualification time.

## Cisco IOS XE Software Release Plan Highlights

With the release of the Cisco ASR 1000 Series routers and Cisco IOS XE Software, Cisco now provides its customers with another world-class software delivery plan. This delivery plan enables customers to qualify releases more quickly and have a definitive release schedule for new software images.

Highlights of the new software release plan include:

- **Time-based releases:** Releases are planned for delivery three times a year (every four months). New software features and hardware are introduced in each release. Releases have fewer incremental features included when compared with traditional Cisco IOS Software releases, reducing customer qualification time.
- **Two release support durations:** Each Cisco IOS XE Software release is classified as either a Standard Support or Extended Support release. A Standard Support release has a total engineering support lifetime of one year, with two scheduled rebuilds. The Extended Support release provides a total engineering support lifetime of two years, with four scheduled rebuilds. For more information about the Cisco IOS XE Software end-of-life policy and associated support milestones for specific Cisco IOS XE Software releases, see product bulletin PB448258 ([http://www.cisco.com/en/US/prod/collateral/routers/ps9343/product\\_bulletin\\_c25-448258.html](http://www.cisco.com/en/US/prod/collateral/routers/ps9343/product_bulletin_c25-448258.html)).
- **Rebuilds scheduled at regular intervals:** Rebuilds are created only for bug fixes, and no new features are included in a rebuild image. For Standard Support releases, the first rebuild image is released two months after the parent image's first customer shipment (FCS). The second rebuild image is released four months after the parent image's FCS. The Extended Support release provides four scheduled rebuilds. The first two of these rebuilds are released at two-month intervals after FCS of the affected Cisco IOS XE Software release, and the second two rebuilds are released at four-month intervals.

thereafter. Releases to correct critical problems (such as those identified by the Cisco Product Security Incident Response Team) are introduced as needed.

- **Modular software image packaging:** Each release contains seven different software modules. Each module enables functions for different components of the Cisco ASR 1000 Series router. A single consolidated Cisco IOS XE Software image file contains all the individual modules.
- **Simplified Cisco IOS Software image options:** Four Cisco IOS XE Software image options are available for customers:
  - Cisco ASR 1000 Series RP1 IP Base
  - Cisco ASR 1000 Series RP1 IP Base Without Cryptography
  - Cisco ASR 1000 Series RP1 Advanced IP Services
  - Cisco ASR 1000 Series RP1 Advanced Enterprise Services
  - Cisco ASR 1000 Series RP1 Advanced Enterprise Services Without Cryptography

### Release Naming

The Cisco IOS XE Software naming schema consists of a three-part numeric identifier describing the major release, release version, and rebuild number of the software image. The identifier uses this format:

X.Y.Z

Where: X = Major Release  
Y = Release Version  
Z = Rebuild

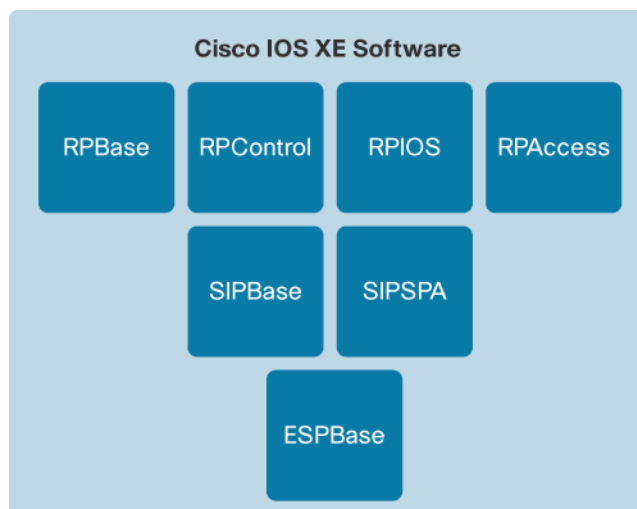
Hence, release version 1 of major release 2 would be shown as 2.1.0, first rebuild of release version 1 would be 2.1.1, second rebuild of release version 1 would be 2.1.2, and so on.

Certain exception events (such as software image deferrals) may require the release of generally available versions of Cisco IOS XE Software without a sequential rebuild number or may not have a rebuild number beginning at zero. For example, Cisco IOS XE Software Release 2.2.1 may be the first generally available release rather than 2.2.0.

### Software Packaging

A Cisco IOS XE Software image consists of seven individual modules (also referred to as subpackages). Individual modules or subpackages of a Cisco IOS XE Software image cannot be downloaded from Cisco.com individually. Individual subpackages can be extracted from the consolidated package from the Cisco ASR 1000 Series router command-line interface (CLI). Figure 1 illustrates how individual software subpackages are bundled in Cisco IOS XE Software.

**Figure 1.** Cisco IOS XE Software Module Bundling



Each Cisco IOS XE Software subpackage provides specific functions for the Cisco ASR 1000 Series router. The functions of the individual Cisco IOS XE Software subpackages are described in Table 1. Table 2 summarizes the naming schema for Cisco IOS XE Software subpackages.

**Table 1.** Cisco IOS XE Software Subpackage Functions

Package	Function
<b>RPBase</b>	Provides the operating system software for the route processor
<b>RPControl</b>	Controls the control plane processes that interface between Cisco IOS Software and the rest of the platform
<b>RPAccess</b>	Provides software required for router access <ul style="list-style-type: none"> <li>The non-K9 version of this subpackage is included only in consolidated packages that do not have cryptographic support.</li> <li>The K9 version of this subpackage includes restricted components (Secure Sockets Layer [SSL] and Secure Shell [SSH]); consolidated packages with this subpackage are subject to export controls.</li> </ul>
<b>RPIOS</b>	Provides the Cisco IOS Software kernel, which is where Cisco IOS Software features are stored and run; each consolidated package has a different RPIOS subpackage
<b>ESPBase</b>	Provides the ESP operating system and control processes and the ESP software
<b>SIPSPA</b>	Provides the shared port adaptor (SPA) driver and associated field-programmable device (FPD) images
<b>SIPBase</b>	Controls the Session Initiation Protocol (SIP) carrier card operating system and control processes

**Table 2.** Cisco IOS XE Sub Package File Name Schema

Package	Package Name
<b>RPBase</b>	ASR1000rp1-rpbase.<ASR_RELEASE>.<IOS_VERSION>.pkg
<b>RPControl</b>	ASR1000rp1-rpcontrol.<ASR_RELEASE>.<IOS_VERSION>.<IOS_TRAIN>.pkg
<b>RPAccess</b>	ASR1000rp1-rpaccess.<ASR_RELEASE>.<IOS_VERSION>.<IOS_TRAIN>.pkg
	ASR1000rp1-rpaccessk9.<ASR_RELEASE>.<IOS_VERSION>.<IOS_TRAIN>.pkg
<b>RPIOS</b>	ASR1000rp1-rpios-ipbase.<ASR_RELEASE>.<IOS_VERSION>.<IOS_TRAIN>.pkg
	ASR1000rp1-rpios-ipbasek9.<ASR_RELEASE>.<IOS_VERSION>.<IOS_TRAIN>.pkg
	ASR1000rp1-rpios-advipservicesk9.<ASR_RELEASE>.<IOS_VERSION>.<IOS_TRAIN>.pkg
	ASR1000rp1-rpios-adventservicesk9.<ASR_RELEASE>.<IOS_VERSION>.<IOS_TRAIN>.pkg
<b>ESPBase</b>	ASR1000rp1-espbase.<ASR_RELEASE>.<IOS_VERSION>.<IOS_TRAIN>.pkg
<b>SIPSPA</b>	ASR1000rp1-sipspa.<ASR_RELEASE>.<IOS_VERSION>.<IOS_TRAIN>.pkg
<b>SIPBase</b>	ASR1000rp1-sipbase.<ASR_RELEASE>.<IOS_VERSION>.<IOS_TRAIN>.pkg

Where:

ASR\_RELEASE: Cisco ASR 1000 Series router Cisco IOS XE Software release version

IOS\_VERSION: Cisco IOS Software version from which the Cisco IOS XE Software image is derived

IOS\_TRAIN: Cisco IOS Software release train from which the Cisco IOS XE Software image is derived

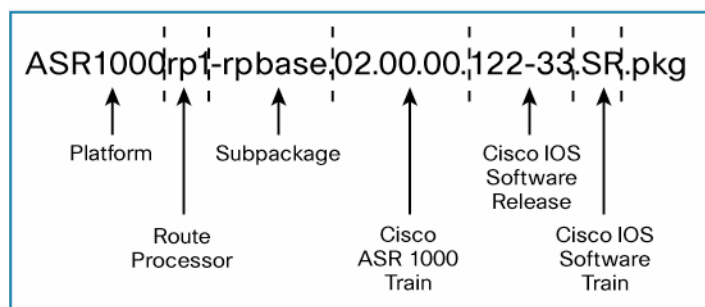
The packages are designed to use the In Service Software Upgrade (ISSU) capability of the Cisco IOS XE Software. Customers have the capability to upgrade only those packages that need to be upgraded. Hence, an entire software image upgrade can be avoided unless the upgrade package requires it.

The examples in Figures 2 and 3 show how the file naming schema is used to identify individual subpackages.

**Figure 2.** Cisco IOS XE Software Subpackage Example and Character Position Definitions (Except RPIOS)

ASR1000rp1-rpbase.02.00.00.122-33.SR.pkg

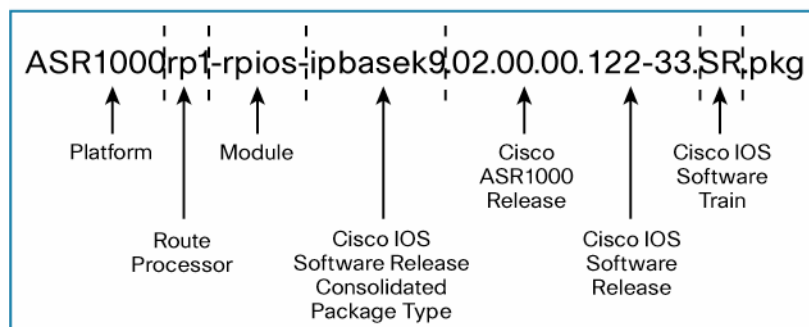
Cisco IOS XE Software Subpackage Position Identifiers (Except RPIOS)



**Figure 3.** Cisco IOS XE Software RPIOS Subpackage Example

ASR1000rp1-rpios-ipbasek9.02.00.00.122-33.SR.pkg

Cisco IOS XE RPIOS Software Subpackage File Name Position Identifiers



### Cisco IOS XE Software Image Options

The Cisco IOS XE Software image incorporates a Cisco IOS Software kernel (RPIOS) that is derived from the Cisco IOS Software 12.2SR release train. The individual Cisco IOS XE Software release is independent of the release cycle of Cisco IOS Software 12.2SR. The content incorporated into the RPIOS module is determined by Cisco based on feature requirements, defect resolution needs, and overall software image quality.

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### **Consolidated Software Packages**

Four consolidated software packages (also referred to as images) are built from the seven individual software modules. The naming and content of these consolidated packages is summarized in Table 3.

**Table 3.** Cisco IOS XE Software Consolidated Packages

Consolidated Package or Image	RPBase	RPContro l	RPIOS	RP Access***	RPAccess K9	SIPBase	SIPSPA	ESP Base
Cisco ASR 1000 Advanced Enterprise Services*	X	X	Advanced Enterprise Services	–	X	X	X	X
Cisco ASR 1000 Advanced Enterprise Services* W/O Cryptography	X	X	Advanced Enterprise Services (Without Cryptography)	X	–	X	X	X
Cisco ASR 1000 Advanced IP Services**	X	X	Advanced IP Services	–	X	X	X	X
Cisco ASR 1000 IP Base	X	X	IP Base	–	X	X	X	X
Cisco ASR 1000 IP Base (Without Cryptography)	X	X	IP Base (Without Cryptography)	X	–	X	X	X

\* Cisco ASR 1000 Advanced Enterprise Services includes the RPIOS Advanced Enterprise Services Cryptography (K9) subpackage with all features including Lawful Intercept and Cisco Unified Border Element (SP Edition) (also known as Session Border Controller [SBC]).

\*\* Cisco ASR 1000 Advanced IP Services includes the RPIOS Advanced IP Services Cryptography (K9) subpackage and supports all features that are in the Cisco ASR 1000 Advanced Enterprise Services image with the exception of some older protocols.

\*\*\* RPAccess is provided as either a cryptographic or noncryptographic version, depending on the type of consolidated package. The noncryptographic version is bundled only with the Cisco ASR 1000 IP Base (Without Cryptography) consolidated package.

**Note:**

- For IP Security (IPsec) Triple Data Encryption Standard (3DES) and Advanced Encryption Standard (AES) encryption support, the minimum image required is the Cisco ASR 1000 Advanced IP Services image.
- The IP Base image supports only SSH, not IPsec 3DES and AES.
- The IP Base (Without Cryptography), Advanced IP Services (Without Cryptography) and the Advanced Enterprise Services (Without Cryptography) images do not support SSH or IPsec 3DES nor AES.

Only the four consolidated Cisco IOS XE Software packages are available for ordering on Cisco.com. Additional feature license charges apply for certain premium services. Table 4 lists the available Cisco IOS XE Software images and provides examples of file names used for the images. Figure 4 shows how the file name is interpreted. Customers should refer to product bulletin PB448292, Cisco IOS XE Feature Licenses ([http://www.cisco.com/en/US/prod/collateral/routers/ps9343/product\\_bulletin\\_c25-448292.html](http://www.cisco.com/en/US/prod/collateral/routers/ps9343/product_bulletin_c25-448292.html)) for more information about the licensing structure used for Cisco IOS XE Software.

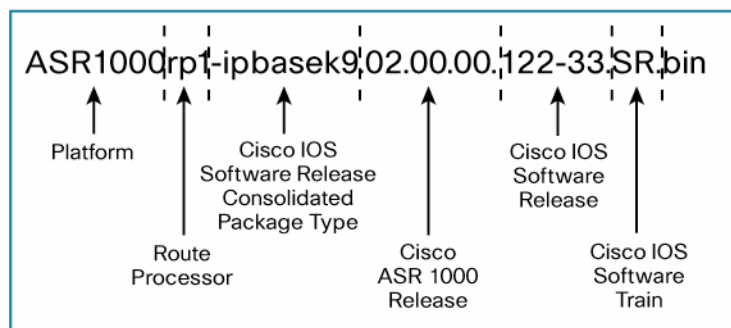
**Table 4.** Cisco IOS XE Software Consolidated Image Filename Schema

Image Description	Filename Example
Cisco ASR 1000 Series RP1 Advanced IP Services	ASR1000rp1-advipservicesk9.02.00.00.122-33.SR.bin
Cisco ASR 1000 Series RP1 Advanced Enterprise Services	ASR1000rp1-adventservicesk9.02.00.00.122-33.SR.bin
Cisco ASR 1000 Series RP1 IP Base	ASR1000rp1-ipbasek9.02.00.00.122-33.SR.bin
Cisco ASR 1000 Series RP1 IP Base Without Cryptography	ASR1000rp1-ipbase.02.00.00.122-33.SR.bin

**Figure 4.** Cisco IOS XE Software Image Filename Example

ASR1000rp1-ipbasek9.02.00.00.122-33.SR.bin

Cisco IOS XE Software Filename Position Identifiers

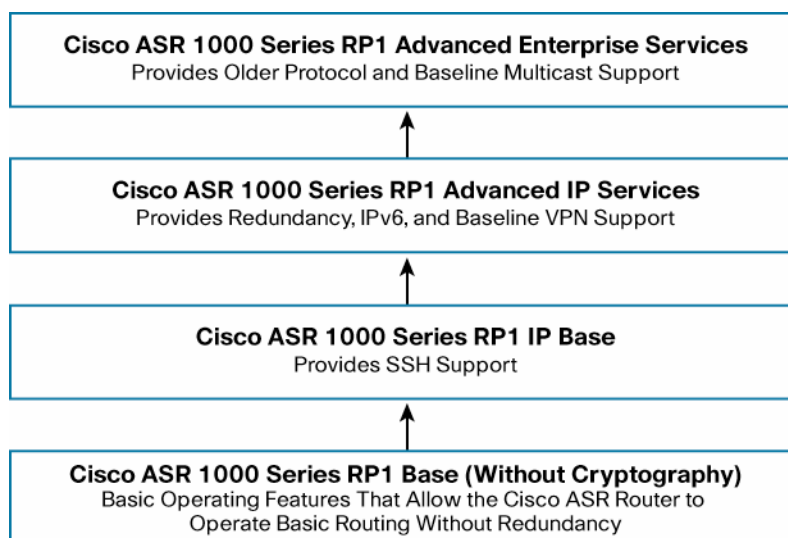


### Cisco IOS XE Software Packaging Feature Inheritance

Feature inheritance is a powerful aspect of Cisco IOS XE Software packaging. After a feature is introduced, it is always present in the more comprehensive packages; for example, all the features in the IP Base package are in the Advanced IP Services and Advanced Enterprise Services packages. Feature inheritance clarifies the feature content of the different packages and illustrates their relationship.

Figure 5 shows how feature inheritance works in Cisco IOS XE Software.

**Figure 5.** Cisco IOS XE Software Feature Inheritance



Note: A software redundancy right-to-use feature license for the Cisco ASR 1000 Series (FLASR1-IOSRED-RTU) must be purchased to enable software redundancy.

## Cisco IOS XE Software Product Identifiers

Cisco IOS XE Software images use an alphanumeric product identifier (PID). Table 5 lists the consolidated software packages available and the associated PIDs. Figure 6 presents an example of a Cisco IOS XE Software PID showing the character positions. Definitions of the character positions are given in Table 6.

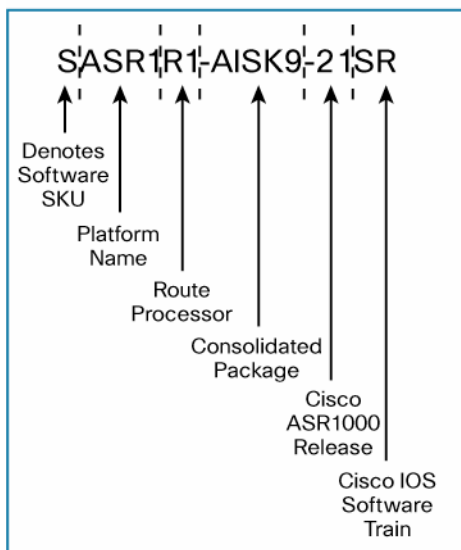
**Table 5.** Cisco IOS XE Consolidated Software Packages

Image Description	Product Code Examples
Cisco ASR1000 Series RP1 Advanced IP Services	SASR1R1-AISK9-21SR
Cisco ASR1000 Series RP1 Advanced Enterprise Services	SASR1R1-AESK9-21SR
Cisco ASR1000 Series RP1 Advanced Enterprise Services W/O Cryptography	SASR1R1-AES-21SR
Cisco ASR1000 Series RP1 IP Base	SASR1R1-IPBK9-21SR
Cisco ASR1000 Series RP1 IP Base Without Cryptography	SASR1R1-IPB-21SR

**Figure 6.** Cisco IOS XE Software PID Example and Character Position Definitions

SASR1R1-AISK9-21SR

Cisco IOS XE Software PID Position Identifiers



**Table 6.** Cisco IOS XE Software PID Definitions

Identifier	Definition
Software PID	SKU for software
Platform name	Product platform (Cisco ASR 1000 Series routers)
Route processor	Route processor compatibility
Consolidated package	One of the 6 available Cisco IOS XE Software images
Cisco ASR 1000 Series release	Major release and release version
Cisco IOS Software release	Cisco IOS Software release

## Ordering Information

To place an order, visit the [Cisco Ordering homepage](#). To download software, visit the [Cisco Software Center](#).

## For More Information

Please refer to the following product bulletins for more information about Cisco IOS XE Software releases and the Cisco ASR 1000 Series:

- Product bulletin PB448292: Cisco IOS XE Software Licensing
- Product bulletin PB448258: Cisco IOS XE Software End-of-Life Policy

Please contact your Cisco account manager for additional information.



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