Cisco ASR 1000 Series Route Processors

Q. What are the Cisco® ASR 1000 Series Route Processors?

A. They are the route processors for the Cisco ASR 1000 Series Aggregated Services Routers. Two route processors are offered at this time for the Cisco ASR 1000 Series: ASR1000-RP1 (RP1) and ASR1000-RP2 (RP2). Details are available in the Cisco ASR 1000 Series Route Processor data sheet at http://www.cisco.com/go/asr1000.

Q. What are the major functions of the Cisco ASR 1000 Series route processors?

A. The Cisco ASR 1000 Series route processor is responsible for the following:

- Building and distributing forwarding information to the Cisco ASR 1000 Series Embedded Services Processor (ESP)
- Implementing Cisco Unified Border Element (SP Edition) (also known as session border controller [SBC]) session setup and teardown and applying per-session policies for voice and video streams
- Offering a portal for stateful firewall policy configuration and distribution to the ESP
- Negotiating and maintaining IP Security (IPsec) authentication, encryption methods, and encryption keys (Internet Key Exchange [IKE])
- Loading the operating system software system images to all installed line cards upon powering up or through operator commands
- Synchronizing the dynamic state conditions for the redundant Cisco IOS® XE Software, the route processor, and ESP components
- Performing high-availability failover for redundant solutions
- Providing out-of-band system console and auxiliary ports, USB, and an Ethernet port for router configuration and maintenance
- Allowing direct system access through the operating system kernel if catastrophic Cisco IOS Software fails
- Monitoring and managing the power and temperature of system components such as line cards, power supplies, and fans

Q. What are the unique physical attributes of the Cisco ASR 1000 Series route processors?

A. The route processor has a field-replaceable hard disk drive, built-in Building Integrated Timing Source (BITS) timing, a universal serial bus (USB), and a dedicated (10/100/1000BASE-T) management port. In addition, it has LED indicator lights to provide ongoing operational information.

Q. What functional LEDs are on the Cisco ASR 1000 Series route processors, and what do the different colors represent?

A. Table 1 lists the route-processor LEDs.

Table 1. Cisco ASR 1000 Series RP1 LEDs

LED Function LABEL	Color or State	Meaning (Default = Off)
Power **PWR**	Green	Green if all power rails are within specification
Status **STAT**	Green	Green when Cisco IOS® Software has booted
	Yellow	Yellow when BootRom has successfully loaded
	Red	Red indicates system failure On @ power up; turned off by software
Active **ACTV**	Green	Lit when this is the active route processor
Standby **STBY**	Yellow	Lit when this is the standby route processor
Critical **CRIT**	Red	Critical alarm indicator On @ power up; turned off by software
Major **MAJ**	Red	Major alarm indicator
Minor **MIN**	Amber	Minor alarm indicator
10/100/1000 RJ-45 interface **LINK**	Solid green	Link with no activity
	Flashing green	Link with activity
	Off	No link
Internal Compact Flash (BootFlash) **BF**	Flashing green	Activity indicator
	Off	No activity
External USB Compact Flash **USB**	Flashing green	Activity indicator
	Off	No activity
Internal hard drive **HD**	Flashing green	Activity indicator
	Off	No activity
BITS interface **CARRIER**	Off	Out of service or not configured
	Green	In frame or working properly
	Amber	Fault or loop condition

Q. Are routing protocols supported on the 10/100/1000BASE-T management interface?

A. Yes, routing protocols are supported on the management interface. However, the management interface is strictly for management purposes only, with limited packet forwarding.

Q. What timing sources does the Cisco ASR 1000 Series route processors support?

A. It can receive timing information through its BITS interface or through a time-division multiplexing (TDM)-based Cisco ASR 1000 Series Shared Port Adapter (SPA).

Memory

Q. What are the DRAM memory options for the Cisco ASR 1000 Series RP1?

A. It uses two 1- or 2-GB double data rate 2 (DDR2) mini-dual in-line memory modules (DIMMs), for a combined total of 2 or 4 GB. The part number to order the 4-GB DRAM as a field-upgradable spare is M-ASR1K-RP1-4GB=. The Cisco ASR 1002 Router chassis has an integrated RP1. The Cisco ASR 1002 Router comes in two versions. The Cisco ASR 1002 comes with 2-GB DRAM and the enhanced-memory Cisco ASR 1002-EM comes with 4-GB DRAM.

Q. What are the DRAM memory options for the Cisco ASR 1000 Series RP2?

A. It uses four 2- or 4-GB synchronous dynamic RAM (SDRAM) for a combined total of 8 or 16 GB. The part number to order the 16-GB DRAM as a field-upgradable spare is M-ASR1K-RP2-16GB=.

Q. What are the eUSB memory options for the Cisco ASR 1000 Series Route Processor?

A. The route processor can support a 1-GB eUSB module.

Software Support

Q. What Cisco IOS Software releases does the Cisco ASR 1000 Series Route Processor support?

A. It runs the Cisco IOS XE Software, which is based on Cisco IOS Software Release 12.2SR.

Q. Are the command-line interface (CLI) commands for Cisco IOS XE Software the same as those for other Cisco IOS Software releases?

A. Yes, Cisco IOS XE Software has the same user interface as standard Cisco IOS Software.

Q. What is the first Cisco IOS XE Software release for the Cisco ASR 1000 Series RP1?

A. Cisco IOS Software Release 2.1.0 is the first software release for the Cisco ASR 1000 Series RP1.

Q. What is the first Cisco IOS XE Software release for the Cisco ASR 1000 Series RP2?

A. Cisco IOS Software Release 2.3.0 is the first software release for the Cisco ASR 1000 Series RP2.

Q. What is the naming schema for the Cisco IOS XE Software?

A. The Cisco IOS XE Software uses the following naming schema:

X.Y.Z

Where: X = Major release
Y = Release version
Z = Rebuild

Hence, Release 1 is shown as 2.1.0, the first rebuild of Release 1 is 2.1.1, and the second rebuild of Release 1 is 2.1.2.

Q. What is the release schedule for the Cisco IOS XE Software?

A. New release versions that will include new features will occur every 4 months. Each release version will have two rebuilds that will address quality concerns and will contain no new features. The first rebuild release will be made available 2 months after shipment of a release version. The second rebuild release will be made available 4 months after shipment of the

same release version. Rebuilds to correct critical problems (such as those identified by the Cisco Product Security Incident Response Team [PSIRT]) will be introduced as needed.

Q. What is a Cisco IOS XE Software consolidated image?

A. The Cisco IOS XE Software uses a modular software design consisting of seven software modules. Each module facilitates functions for different components of the Cisco ASR 1000 Series Router platform. A single consolidated Cisco ASR 1000 software image file will contain the seven individual modules.

Q. What are the Cisco IOS XE Software modules?

A. Table 2 lists the modules that comprise the Cisco IOS XE Software.

Table 2. Cisco IOS XE Software Images

Image	Image Name	Purpose
RPBase	ASR1000rp<1 or 2>-rpbase.<ASR_RELEASE>.<IOS_VERSION>.<IOS_RELEASE>.pkg	Provides the operating system software for the route processor
RPControl	ASR1000rp<1 or 2>-rpcontrol.<ASR_RELEASE>.<IOS_VERSION>.<IOS_RELEASE>.pkg	Controls the control-plane processes that interface between Cisco IOS Software and the rest of the platform
RPAccess	ASR1000rp<1 or 2>-rpaccess.<ASR_RELEASE>.<IOS_VERSION>.<IOS_RELEASE>.pkg	(Software required for router access) Included (non-K9 version) only in consolidated images that do not have cryptographic support
	ASR1000rp<1 or 2>-rpaccessk9.<ASR_RELEASE>.<IOS_VERSION>.<IOS_RELEASE>.pkg	(Software required for router access) Includes (K9 version) restricted components (Secure Sockets Layer [SSL], Secure Shell [SSH] Protocol, and other security features); consolidated images are subject to export controls
RPIOS	ASR1000rp<1 or 2>-rpios-ipbase.<ASR_RELEASE>.<IOS_VERSION>.<IOS_RELEASE>.pkg	Provides the Cisco IOS Software kernel, which is where Cisco IOS Software features are stored and run; each consolidated image has a different RPIOS
	ASR1000rp<1 or 2>-rpios-ipbasek9.<ASR_RELEASE>.<IOS_VERSION>.<IOS_RELEASE>.pkg	
	ASR1000rp<1 or 2>-rpios-advipservicesk9.<ASR_RELEASE>.<IOS_VERSION>.<IOS_RELEASE>.pkg	
	ASR1000rp<1 or 2>-rpios-adventservicesk9.<ASR_RELEASE>.<IOS_VERSION>.<IOS_RELEASE>.pkg	
ESPBase	ASR1000rp<1 or 2>-espbase.<ASR_RELEASE>.<IOS_VERSION>.<IOS_RELEASE>.pkg	Provides the ESP operating system and control processes, and the ESP software
SIPSPA	ASR1000rp<1 or 2>-sipspa.<ASR_RELEASE>.<IOS_VERSION>.<IOS_RELEASE>.pkg	Provides the SPA driver and associated field-programmable device (FPD) images
SIPBase	ASR1000rp<1 or 2>-sipbase.<ASR_RELEASE>.<IOS_VERSION>.<IOS_RELEASE>.pkg	Controls the SIP carrier-card operating system and control processes

Q. Why does booting individual Cisco IOS XE Software modules consume less memory and boot faster than booting a consolidated image?

A. When a Cisco ASR 1000 Series Router is booted through individual modules, software image content from the route processor is copied into memory on an as-needed basis, conserving memory for other router processes and leading to more efficient booting.

Q. What are the advantages of booting a Cisco IOS XE Software consolidated image?

A. The advantages include ease of management and the ability to boot an image stored on a network Trivial File Transfer Protocol (TFTP) server.

Q. What are the advantages of booting the Cisco IOS XE Software in individual module mode?

A. The advantages of booting the system in individual module mode include faster booting, route-processor memory efficiency, and In Service Software Upgrade (ISSU) support for the Cisco IOS Software route processor for single Cisco ASR 1000 Series Route Processor solutions.

Q. Can the router boot directly from Cisco IOS XE Software images stored in USB memory keys?

A. Yes.

Q. What are the limitations from a router file system standpoint for booting the Cisco IOS XE Software?

A. All image files must be kept in the same directory on the Cisco ASR 1000 Series Router hard disk drive, embedded (EUSB), or bootflash. Booting image files stripped across file systems and from USB memory keys is not supported.

Q. What are the requirements for ISSU on a single Cisco ASR 1000 Series route processor system?

A. The requirements follow:

- The Cisco ASR 1000 Series RP1 must have 4 GB of DRAM
  - Note: The Cisco ASR 1002 Router comes in two versions. The version that supports 4-GB DRAM is the Cisco ASR 1002-EM; the Cisco ASR 1002 supports 2-GB DRAM only
- ISSU is supported only on RPControl, RPSecurity, and RPIOS images on single Cisco ASR 1000 Series Route Processor systems. You can perform an ISSU upgrade on the RPIOS module on a single Cisco ASR 1000 Series route processor system only if the router was originally booted with active/standby RPIOS processes

Q. When I issue the show memory command, the Cisco ASR 1000 Series route processor is reporting less than 50 percent of the installed memory. Why isn't the route processor recognizing all of the installed memory?

A. On the Cisco ASR 1000 Series route processor, the show memory command is reporting only the memory that has been allocated to the RPIOS process. The Cisco IOS XE Software command show platform software memory provides a memory breakdown by platform processes.

Q. Why does the Cisco IOS XE Software RPIOS process consume only so much or so little memory?

A. The Cisco IOS XE Software RPIOS process is preallocated a fixed amount of memory upon startup. The memory assigned to the RPIOS process never shrinks or grows, and is used to manage both the routing and forwarding tables on the router.

Q. Can the router be configured to allocate more or less Cisco ASR 1000 Series route processor memory to the RPIOS process?

A. No, RPIOS memory allocation is preallocated upon bootup and cannot be altered.

Q. Why do the Cisco IOS XE Software RPIOS processes consume less memory when running in dual versus standalone mode?

A. The Cisco IOS XE Software reserves approximately 50 percent of the Cisco ASR 1000 RP1 memory for the RPIOS process(es). When running RPIOS in dual mode, the software preallocates approximately 25 percent of the Cisco ASR 1000 route processor memory to each RPIOS process.

Q. What are the scalability effects of running dual Cisco IOS XE Software processes?

A. When running dual Cisco IOS XE Software processes, the maximum routing table supported is reduced by approximately 50 percent.

Q. Is High Availability supported on the Cisco ASR 1000 Series route processor?

A. The Cisco ASR 1000 Series RP1 with 4 GB and RP2 both support RPIOS High Availability. Full RP hardware and software High Availability support is available only on Cisco ASR 1006 Routers between common route processor types. ASR1006 hardware and software HA is not supported between RP1 and RP2 installed in the same system.

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