Cisco ASR 1000 Series Route Processors

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

Q: What are the major functions of the Cisco ASR 1000 Series route processors?
A: The Cisco ASR 1000 Series route processors are responsible for the following:

- Building and distributing forwarding information to the Cisco ASR 1000 Series Embedded Services Processor (ESP)
- 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 (or solid state drive in the RP3), 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.
What functional LEDs are on the Cisco ASR 1000 Series route processors, and what do the different colors represent?

Table 1 lists the route processor LEDs.

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

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

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

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).

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

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=.

**What are the DRAM memory options for the Cisco ASR 1000 Series RP3?**

It uses two 4-GB DIMMs for 8 GB, two 8-GB DIMMs for 16 GB, four 8-GB DIMMs for 32 GB, or four 16-GB DIMMs for 64 GB. The part numbers to order the field-upgradable 16-, 32- and 64-GB DRAM spares are M-ASR1K-RP3-16GB=, M-ASR1K-RP3-32GB=, and M-ASR1K-RP3-64GB=, respectively.

**What are the hard drive options for the Cisco ASR 1000 Series Route Processors?**

The RP2 uses a 80 GB hard disk drive for storage. The RP3 uses a 100-, 200-, or 400-GB Solid State Drive (SSD) for storage. The part numbers to order the field-upgradable 200- and 400-GB SSDs are M-ASR1K-SSD-200GB= and M-ASR1K-SSD-400GB=, respectively.

**Software support**

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

It runs the Cisco IOS XE Software.

**Are the Command-Line Interface (CLI) commands for Cisco IOS XE Software the same as those for other Cisco IOS Software releases?**

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

**What is the first Cisco IOS XE Software release for the RP2?**

Cisco IOS XE Software Release 2.3.0 is the first software release for the RP2.

**What is the first Cisco IOS XE Software release for the RP3?**

Cisco IOS XE Software Release 16.3.1 is the first software release for the RP3.

**What is the release schedule for the Cisco IOS XE Software?**

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.
### What are the Cisco IOS XE Software modules?

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

<table>
<thead>
<tr>
<th>Image</th>
<th>Image name</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>RPBase</td>
<td>ASR1000rpx86-rpbase.&lt;ASR_RELEASE&gt;.&lt;IOS_VERSION&gt;.&lt;IOS_RELEASE&gt;.pkg</td>
<td>Provides the operating system software for the route processor</td>
</tr>
<tr>
<td>RPControl</td>
<td>ASR1000rpx86-rpcontrol.&lt;ASR_RELEASE&gt;.&lt;IOS_VERSION&gt;.&lt;IOS_RELEASE&gt;.pkg</td>
<td>Controls the control-plane processes that interface between Cisco IOS Software and the rest of the platform</td>
</tr>
<tr>
<td>RPAccess</td>
<td>ASR1000rpx86-rpaccess.&lt;ASR_RELEASE&gt;.&lt;IOS_VERSION&gt;.&lt;IOS_RELEASE&gt;.pkg</td>
<td>(Software required for router access) Included (non-K9 version) only in consolidated images that do not have cryptographic support</td>
</tr>
<tr>
<td></td>
<td>ASR1000rpx86-rpaccessk9.&lt;ASR_RELEASE&gt;.&lt;IOS_VERSION&gt;.&lt;IOS_RELEASE&gt;.pkg</td>
<td>(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</td>
</tr>
<tr>
<td>RPIOS</td>
<td>ASR1000rpx86-rpios-universalk9.&lt;ASR_RELEASE&gt;.&lt;IOS_VERSION&gt;.&lt;IOS_RELEASE&gt;.pkg</td>
<td>Provides the Cisco IOS Software kernel, which is where Cisco IOS Software features are stored and run; each consolidated image has a different RPIOS</td>
</tr>
<tr>
<td>ESPBase</td>
<td>ASR1000rpx86--espbase.&lt;ASR_RELEASE&gt;.&lt;IOS_VERSION&gt;.&lt;IOS_RELEASE&gt;.pkg</td>
<td>Provides the ESP operating system and control processes, and the ESP software</td>
</tr>
<tr>
<td>SIPSPA/ELCSPA</td>
<td>ASR1000rpx86-sipspa</td>
<td>elcspa.&lt;ASR_RELEASE&gt;.&lt;IOS_VERSION&gt;.&lt;IOS_RELEASE&gt;.pkg</td>
</tr>
<tr>
<td>SIPBase/ELCBase</td>
<td>ASR1000rpx86-sipbase</td>
<td>elcbase.&lt;ASR_RELEASE&gt;.&lt;IOS_VERSION&gt;.&lt;IOS_RELEASE&gt;.pkg</td>
</tr>
</tbody>
</table>

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

Yes.

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

All image files must be kept in the same directory on the Cisco ASR 1000 Series Router hard 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 Software Upgrade Procedure on a single Cisco ASR 1000 Series route processor system?

A: The requirements follow:

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 resources 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: Amount of memory reserved for RPIOS in RP2 and RP3 depends on the amount of memory configured on the RP. When running RPIOS in dual mode, the amount of memory allocated to each IOS process will be approximately reduced by half comparing to the same system running single IOS 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 processors?

A: The Cisco ASR 1000 Series RP2, and RP3 all support RPIOS High Availability. Full support for RP hardware and software High Availability is available on the Cisco ASR 1006, 1006-X, 1009-X, and 1013 Routers between common route processor types.

Q: Is the ASR 1000 Series Cisco SD-WAN capable?

A: The ASR 1000 Series will support Cisco SD-WAN beginning with the Cisco SD-WAN Software Release 18.3 and IOS XE SD-WAN Software Release 16.9.1. The following models from the ASR 1000 Series are currently supported: ASR 1001-X, ASR 1002-X, ASR 1001-HX and ASR 1002-HX. Please contact Cisco for more information, as support for Cisco SD-WAN on additional models is on the roadmap.

Cisco SD-WAN subscriptions for ASR 1000 include two subscription license options: Cisco DNA Advantage and Cisco DNA Premier. Cisco DNA Advantage provides for advanced WAN topologies, application aware policies and is supported by enhanced network security. Cisco DNA Premier provides for Cloud connectivity with unlimited segmentation, advanced application optimization and network analytics, secured by advanced threat protection.