



Cisco ASR 1000 Series Embedded Services Processor

General Information

Q What are the Cisco® ASR 1000 Series Embedded Services Processors?

A The Cisco ASR 1000 Series Embedded Services Processors (ESPs) are centralized forwarding engines for the Cisco ASR 1000 Series Aggregated Services Routers. These modules provide silicon- and hardware-based assistance to sustain high bandwidth and throughput even with features enabled. The following ESPs are offered at this time for the Cisco ASR 1000 Series: 20-, 40-, 100- and 200-Gbps Cisco ASR 1000 ESPs (part numbers ASR1000-ESP20, ASR1000-ESP40, ASR1000-ESP100, and ASR1000-ESP200, respectively). The 20-Gbps ESP (ESP20) supports 20 Gbps of bandwidth; the 40-Gbps ESP (ESP40) supports 40 Gbps of bandwidth; the 100-Gbps ESP (ESP100) supports 100 Gbps of bandwidth, and the 200-Gbps ESP (ESP200) supports 200 Gbps of bandwidth. You can deploy the ESPs in customer networks that require 1 + 1 redundancy.

Q What gives the ESPs a sustainable competitive advantage?

A All ESPs are based on the innovative Cisco Flow Processor (QFP) for next-generation forwarding and queuing in silicon.

Q What is the main difference between the ESP20, ESP40, ESP100, and ESP200?

A The ESP20 supports 20 Gbps of bandwidth, the 40-Gbps ESP (ESP40) supports 40 Gbps of bandwidth, the 100-Gbps ESP (ESP100) supports 100 Gbps of bandwidth, and the 200-Gbps ESP (ESP200) supports 200 Gbps of bandwidth.

Q What features best highlight the category-leading performance of the ESPs?

A The modules feature hardware-assisted quality of service (QoS), industry-leading hardware-based encryption, and special jitter- and latency-minimizing multicast packet replication. These features allow the integration of services and the enablement of features that typically would result in performance degradation from manufacturers' advertised throughput maxima.

When used in combination with the Cisco ASR 1009-X, or ASR 1013 Router chassis, a pair of ESP200 modules can be configured on the router (1 + 1 redundancy) to provide carrier-class high availability. When used in combination with the Cisco ASR 1006-X, ASR 1009-X, ASR 1006 or ASR 1013 Router chassis, a pair of ESP100 modules can be configured on the router (1 + 1 redundancy) to provide carrier-class high availability.

Product Benefits

Q The Cisco ASR 1000 Series Router is ideally suited for deployment as a Point-to-Point Termination and Aggregation (PTA) device, L2TP Access Concentrator (LAC), or L2TP Network Server (LNS). Where are the 20-, 40-, 100-, and 200-Gbps ESPs positioned in a service provider's edge network?

A The Cisco ASR 1000 Series Router interfaces with the service provider's voice and multimedia (for example, telepresence) services directly at the edge. This solution requires no overlay network, network appliances, or service blades, resulting in lower operating expenses and flexible deployment models.

The Cisco ASR 1000 Series Router serves as a WAN aggregation router with high-density Gigabit Ethernet or WAN link aggregation and up to 100-Gigabit Ethernet uplink capability. Key benefits offered by the Cisco ASR 1000 Series in this scenario are Layer 2 and Layer 3 VPN functions and line-rate multicast support for triple-play (data, voice, and video) applications for business and residential users.

The Cisco ASR 1000 Series Router is ideally suited for deployment in Internet Protocol Radio Access Network (IPRAN) aggregation systems and as a high-speed managed customer premises equipment (CPE) device.

The 100- and 200-Gbps ESPs enable the Cisco ASR 1000 Series Router with potentially higher broadband session numbers.

Q Where are the Cisco 20-, 40-, 100-, and 200-Gbps ESPs positioned in an enterprise network?

A The Cisco ASR 1000 Series Router facilitates a branch-office architecture that offers excellent investment protection with services and scalability. Solution benefits consist of a multigigabit encryption rate (1.8- to 78-Gbps) IPsec, optimization of the WAN to route around brownouts in the service provider network for guaranteeing mission-critical applications, and persistent manageability even if the Cisco IOS Software is down.

The Cisco ASR 1000 Series Router at the WAN aggregation headend or as an Internet gateway delivers multigigabit Cisco IOS Firewall capability in a router without the need for service blades. All firewall processing at up to 200 Gbps is performed in silicon by the Cisco Flow Processor. In addition, the Cisco ASR 1000 Series Router provides high-speed logging through NetFlow Version 9 and ongoing forwarding with baseline and firewall features enabled, without performance degradation.

The Cisco ASR 1000 Series Router can capture Layer 2-through-Layer 7 packet data and route it through the Layer 3 cloud to the data center. No service blades are required in this solution, which offers full packet visibility compared to IP Traffic Export. The Cisco ASR 1000 Series Router delivers one of the highest numbers of monitoring sessions available in the industry.

Software Releases

Q What is the minimum software release required to support the 20-, 40-, 100-, and 200-Gbps ESPs?

A The minimum software release required for the 20-Gbps ESP is Cisco IOS XE Software Release 2.2. The minimum software release required for the 40-Gbps ESP is Cisco IOS XE Software Release 3.1S. The minimum software release required for the 100-Gbps ESP is Cisco IOS XE Software Release 3.7.1. The minimum software release required for the 200-Gbps ESP is Cisco IOS XE Software 3.10.0.

Q What Cisco IOS Software features are supported by the 20-, 40-, and 100-Gbps ESPs?

A The following are some of the features supported with Cisco IOS XE Software Release 2.2 (ESP20), Release 3.1S (ESP40), Release 3.7S (ESP100), or Release 3.10S (ESP200):

- IPv4 and IPv6 Unicast and Multicast
- High availability: Nonstop Forwarding with Stateful Switchover (NSF/SSO) and In-Service Software Upgrade (ISSU)
- Commonly used broadband aggregation features and the Cisco Intelligent Services Gateway (ISG)
- Quality of Service (QoS)
- Security access control lists (ACLs)
- Network-Based Application Recognition (NBAR) and Cisco IOS Software Flexible Packet Matching (FPM)
- NetFlow
- Compressed Real-Time Transport Protocol (CRTP)
- Security features: Firewall, Network Address Translation (NAT), and IPsec
- Commonly used Multiprotocol Label Switching (MPLS) Layer 2 and Layer 3 VPN features

Q How is high availability supported by the 20-, 40-, 100-, and 200-Gbps ESPs?

A ESP high availability is determined by chassis. Cisco ASR 1001-X, ASR 1002-X, ASR 1001-HX, ASR 1002-HX and ASR 1004 Routers do not support redundant ESPs, so these chassis do not support ESP high availability. The Cisco ASR 1006 Router supports ESP40, and ESP100 high availability. The Cisco ASR 1006, ASR 1006-X, ASR 1009-X and ASR 1013 Routers support ESP100 high availability. The Cisco ASR 1009-X and ASR 1013 Routers support ESP100 or ESP200 high availability.

Technical Background

Q What underlies the hardware architecture of the 20-, 40-, 100-, and 200-Gbps ESPs?

A The 20-, 40-, 100-, and 200-Gbps ESPs are based on the innovative Cisco Flow Processor multicore chipset. Data-path communication relies on Cisco proprietary high-speed serial links.

Q Which functions are performed directly by the Cisco Flow Processor onboard the 20-, 40-, 100-, and 200-Gbps ESPs?

A The Cisco Flow Processor performs all data-plane forwarding functions, including MAC classification, Layer 2 and Layer 3 forwarding, QoS, ACL, VPN, broadband, and NetFlow, to name a few.

Q What do the ESP bandwidths of 20, 40, 100, and 200 Gbps stand for?

A The ESP bandwidths denote the total forwarding throughput of the modules, regardless of the direction (ingress or egress). High-priority traffic, as long as it is not oversubscribed, is not affected by this bandwidth limit.

Q What are the specifics of the Cisco Flow Processor used onboard the 20-Gbps ESPs?

A The Cisco Flow Processor chipset onboard the 20-Gbps ESPs consists of 40 PPEs capable of running four threads each at a clock rate of 1.2 GHz. The Cisco Flow Processor is complemented by 1 Gb of memory to support 128,000 queues and 40 Mb of TCAM. In addition, the 20-Gbps ESP features 4 Gb of DRAM memory available to its board controller CPU.

Q What are the specifics of the Cisco Flow Processor used onboard the 40-Gbps ESPs?

A The Cisco Flow Processor chipset onboard the 40-Gbps ESPs consists of 40 PPEs capable of running four threads. The Cisco Flow Processor is complemented by 1 Gb of memory to support 128,000 queues and 40 Mb of content-addressable memory (TCAM).

Q What are the specifics of the Cisco Flow Processor used onboard the 100-Gbps ESPs?

A The Cisco Flow Processor chipset onboard the 100-Gbps ESPs consists of 124 PPEs capable of running four threads per PPE. The Cisco Flow Processor is complemented by 4 GB of memory to support 232,000 queues and 80 Mb of content-addressable memory (TCAM).

Q What are the specifics of the Cisco Flow Processor used onboard the 200-Gbps ESPs?

A The Cisco Flow Processor chipset onboard the 200-Gbps ESPs consists of 248 PPEs capable of running four threads per PPE. The Cisco Flow Processor is complemented by 8 GB of memory to support 464,000 queues and two 80-Mb content-addressable memory (TCAM) modules.

Product Ordering

Q How do I order the ESPs?

A To place an order, visit the Cisco Ordering Home Page at <http://www.cisco.com/en/US/ordering/index.shtml>.

Table 1. Product Ordering

Product Name	Part Number
Cisco ASR 1000 Embedded Services Processor 20Gbps	ASR1000-ESP20
Cisco ASR 1000 Embedded Services Processor 40Gbps	ASR1000-ESP40
Cisco ASR 1000 Embedded Services Processor 100Gbps	ASR1000-ESP100
Cisco ASR 1000 Embedded Services Processor 200Gbps	ASR1000-ESP200

To download software, visit the Cisco Software Center at <https://software.cisco.com/download/navigator.html>.

Q With what complementary hardware products is the 20-Gbps ESP compatible?

A Refer to Table 4 for a list of Cisco hardware products compatible with the ESP20.

Table 2. Cisco ASR 1000 Series ESP20 Compatible Chassis and RP

Product Name	Part Number
Cisco ASR 1004 Router Chassis	ASR1004
Cisco ASR 1006 Router Chassis*	ASR1006
Cisco ASR 1000 Route Processor 2	ASR1000-RP2

* Supports 1+1 redundancy when configured with two ESP20 modules.

Q With what complementary hardware products is the 40-Gbps ESP compatible?

A Refer to Table 5 for a list of Cisco hardware products compatible with the ESP40.

Table 3. Cisco ASR 1000 Series ESP40 Compatible Chassis and RP

Product Name	Part Number
Cisco ASR 1006 Router Chassis*	ASR1006
Cisco ASR 1013 Router Chassis*	ASR1013
Cisco ASR 1000 Route Processor 2	ASR1000-RP2

* Supports 1+1 redundancy when configured with two ESP40 modules.

Q With what complementary hardware products is the 100-Gbps ESP compatible?

A Refer to Table 6 for a list of Cisco hardware products compatible with the ESP100.

Table 4. Cisco ASR 1000 Series ESP100 Compatible Chassis and RP

Product Name	Part Number
Cisco ASR 1006 Router Chassis*	ASR1006
Cisco ASR 1013 Router Chassis*	ASR1013
Cisco ASR 1006-X Router Chassis*	ASR1006-X
Cisco ASR 1009-X Router Chassis*	ASR1009-X
Cisco ASR 1000 Route Processor 2	ASR1000-RP2

* Supports 1+1 redundancy when configured with two ESP100 modules.

Q With what complementary hardware products is the 200-Gbps ESP compatible?

A Refer to Table 7 for a list of Cisco hardware products compatible with the ESP200.

Table 5. Cisco ASR 1000 Series ESP200 Compatible Chassis and RP

Product Name	Part Number
Cisco ASR 1013 Router Chassis*	ASR1013
Cisco ASR 1009-X Router Chassis*	ASR1009-X
Cisco ASR 1000 Route Processor 2	ASR1000-RP2

* Supports 1+1 redundancy when configured with two ESP200 modules.

Q Where can I get future product information for the 20-, 40-, 100-, and 200-Gbps ESPs?

A Please check with your local Cisco account representative or visit: <http://www.cisco.com/go/asr1000>.

Q Where can I get pricing for the 20-, 40-, 100-, and 200-Gbps ESPs?

A Please refer to the Cisco Pricing Tool at <http://www.cisco.com/en/US/ordering/index.shtml>.