# Cisco ASR 1000 Series Embedded Services Processors

## Product Overview

The Cisco® ASR 1000 Series Embedded Services Processors (ESPs) are based on the innovative, industry-leading Cisco QuantumFlow Processor for next-generation forwarding and queuing in silicon. The Cisco ASR 1002-X Router, 100-Gbps Cisco ASR 1000 Series ESP module, and the 200-Gbps Cisco ASR 1000 Series ESP module introduce the second generation of the Cisco QuantumFlow Processor hardware and software architecture.

The 5-, 10-, 10-N-, 20-, 40-, 100-, and 200-Gbps Cisco ASR 1000 Series ESPs (part numbers ASR1000-ESP5, ASR1000-ESP10, ASR1000-ESP10-N, ASR1000-ESP20, ASR1000-ESP40, ASR1000-ESP100, and ASR1000-ESP200, respectively) provide centralized forwarding-engine options for the Cisco ASR 1000 Series Aggregation Services Routers. Additionally, the Cisco ASR 1002 Fixed Router includes a nonmodular, fixed ESP with throughput of 2.5 Gbps, and the Cisco ASR 1001 and ASR 1002-X Routers come with a nonmodular, fixed ESP with throughput of 2.5 Gbps (for ASR 1001) and 5 Gbps (for ASR 1002-X), upgradable with a software-activated performance upgrade license to 5 Gbps (for ASR 1001), and 10, 20, or 36 Gbps (for ASR 1002-X), respectively.

The Cisco ASR 1000 Series 10-N-Gbps ESP (ASR1000-ESP10-N) is the nonencryption version of the Cisco ASR 1000 Series 10-Gbps ESP (ASR1000-ESP10). The Cisco ASR 1000 Series 10-N-Gbps ESP can support only noncryptographic Cisco IOS® Software images and will never support encryption capabilities such as IP Security (IPsec). In future releases, the Cisco ASR 1000 Series 10-N-Gbps ESP may support secured network management features such as Secure Shell (SSH) Protocol, Secure Sockets Layer (SSL), and Simple Network Management Protocol Version 3 (SNMPv3).

The Cisco ASR 1000 Series ESPs are responsible for the data-plane processing tasks, and all network traffic flows through them. The modules perform all baseline packet routing operations, including MAC classification, Layer 2 and Layer 3 forwarding, quality-of-service (QoS) classification, policing and shaping, security access control lists (ACLs), VPNs, load balancing, and NetFlow. They are also responsible for features such as firewalls, intrusion prevention, Network-Based Application Recognition (NBAR), Network Address Translation (NAT), and Cisco IOS Flexible Pattern Matching.

The Cisco ASR 1002 Fixed Router and Cisco ASR 1001 Router are the two chassis that support the 2.5-Gbps ESP, which is integrated in the chassis. Upgrading the Cisco ASR 1001 to 5 Gbps or upgrading the Cisco ASR 1002-X to 10, 20, or 36 Gbps requires no additional hardware. With the enforced performance upgrade licenses, you can easily upgrade with only a license. For details about the Cisco ASR 1000 IOS XE Software image and licenses, including the software activation that is supported at first customer shipment (FCS) on the Cisco ASR 1001 and ASR 1002-X, please refer to the Cisco ASR 1000 Series Software Activation product bulletin.

The Cisco ASR 1000 Series 5-Gbps ESP (ASR1000-ESP5) supports 5-Gbps bandwidth and is supported exclusively in combination with the Cisco ASR 1002 Fixed Router chassis. The Cisco ASR 1000 Series 10-Gbps ESP (ASR1000-ESP10 and ASR1000-ESP10-N; refer to Figure 1) supports 10-Gbps bandwidth; it is supported on

Cisco ASR 1002, ASR 1004, and ASR 1006 Routers, and can optionally be deployed in customer networks that require 1 + 1 hardware redundancy with the Cisco ASR 1004 and ASR 1006.

The Cisco ASR 1000 Series 20-Gbps ESP (ASR1000-ESP20) supports 20-Gbps bandwidth; it is supported on the Cisco ASR 1004 and ASR 1006 Router chassis, and can optionally be deployed in customer networks that require 1 + 1 hardware redundancy.

The Cisco ASR 1000 Series 40-Gbps ESP (ASR1000-ESP40) supports 40-Gbps bandwidth; it is supported on the Cisco ASR 1004, ASR 1006, and ASR 1013 Router chassis, and can optionally be deployed in customer networks that require 1 + 1 hardware redundancy.

The Cisco ASR 1000 Series 100-Gbps ESP (ASR1000-ESP100) supports 100-Gbps bandwidth; it is supported on the Cisco ASR 1006 and ASR 1013 Router chassis and can optionally be deployed in customer networks that require 1 + 1 hardware redundancy. The Cisco ASR 1000 Series 100-Gbps ESP requires the Cisco ASR 1000 1600W AC or DC Power Supply (ASR1013/06-PWR-AC or ASR1013/06-PWR-DC, respectively).

The Cisco ASR 1000 Series 200-Gbps ESP (ASR1000-ESP200) supports 200-Gbps bandwidth; it is supported on the Cisco ASR 1013 Router chassis and can optionally be deployed in customer networks that require 1 + 1 hardware redundancy. The Cisco ASR 1000 Series 200-Gbps ESP requires the Cisco ASR 1000 1600W AC or DC Power Supply (ASR1013/06-PWR-AC or ASR1013/06-PWR-DC, respectively).

Performance highlights of the 20-, 40-, 100-, and 200-Gbps ESPs include hardware-assisted policing; encryption capability of 8, 11, 29, and 78 Gbps, respectively; and special jitter- and latency-minimizing multicast packet replication. The encryption capability of the 10-Gbps ESP is rated for 4 Gbps, whereas the 5-Gbps ESP as well as the integrated ESP on the Cisco ASR 1001 chassis are rated for 1.8 Gbps and the 2.5-Gbps ESP integrated on the Cisco ASR 1002-F chassis is rated for 1.0 Gbps. Cisco ASR 1002-X encryption capability is rated for 4 Gbps. The Cisco ASR 1000 Series 10-N-Gbps ESP has the same performance characteristics as the Cisco ASR 1000 Series 10-Gbps ESP but does not support encryption services.

**Figure 1.** Cisco ASR 1000 Series ESP (10-Gbps ESP shown)

## Applications

The Cisco 2.5-, 5-, 10-, 10-N-, 20-, 40-, 100-, and 200-Gbps ESPs facilitate the following solutions:

- Service provider broadband: The Cisco ASR 1000 Series Router serves as a broadband aggregation router that terminates up to 64,000 subscriber sessions and supports features such as session-border-controller (SBC) (formally known as Cisco Unified Border Element [SP Edition]) for voice over IP (VoIP) and video (for example, Cisco TelePresence® communications systems) services and hardware-assisted per-user firewall for security.

- Service provider edge (PE): The Cisco ASR 1000 Series Router interfaces with service provider–provisioned voice and multimedia (for example, Cisco TelePresence communications systems) services directly at the edge. No overlay network, network appliances, or service blades are required in this solution for lower operating expenses (OpEx) and flexible deployment models.
  This router supports protected signaling for both voice and video services and facilitates 32,000 voice calls concurrent with up to 200 Gbps of data traffic with accounting, firewall, and call-quality features enabled.
- Service provider–managed customer premise equipment (CPE): The Cisco ASR 1000 Series Router serves as a WAN aggregation router with high-density Gigabit Ethernet or WAN link aggregation and 10 Gigabit Ethernet uplink capability. Key benefits are Layer 2 and Layer 3 VPN functions and line-rate IP Multicast support for triple-play (data, voice, and video) deployments.
- Enterprise WAN aggregation: The Cisco ASR 1000 Series Router at the WAN aggregation headend facilitates a branch-office architecture that offers excellent investment protection with services and scale. Solution benefits consist of a multigigabit encryption rate (up to 78-Gbps IPsec) and optimization of the WAN to route around brownouts in the service provider network to guarantee mission-critical applications. (Please note that this product includes software developed by Cavium Networks.) The Cisco ASR 1000 Series 10-N-Gbps ESP supports all of the described services except for IPsec encryption.
- Enterprise Internet gateway: The Cisco ASR 1000 Series Router as an Internet gateway delivers multigigabit Cisco IOS Firewall capability in a router without the need for service blades. All firewall processing is performed in silicon by the Cisco QuantumFlow Processor at up to 2.5, 5, 10, 20, 40, 100, or 200 Gbps. In addition, the router provides high-speed logging through Sampled NetFlow Version 9 and ongoing forwarding with baseline and firewall features enabled.
- Data monitoring (Encapsulated Remote Switched Port Analyzer [ERSPAN]): 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.

## Performance and Scaling

Table 1 lists the performance and scaling features offered by the Cisco ASR 1001 chassis with an integrated ESP module.

**Table 1.** Cisco ASR 1001 with Integrated 5-Gbps ESP Module and 8-GB Memory

| Feature | Specification |
|---|---|
| **Performance** | |
| **Up to 7.5 Mpps** | Variable forwarding performance, depending on features configured |
| **4 Mpps** | For the combination of the following commonly used features: IPv4 forwarding, IP Multicast, ACL, QoS, Reverse Path Forwarding (RPF), load balancing, and Sampled NetFlow |
| **Bandwidth** | |
| **5 Gbps** | For the combination of commonly used features later than Firewall or NAT |
| **1.8 Gbps** | For plain IPsec encryption |
| **Scaling** | |
| **Access control** | 4,000 unique ACLs and 25,000 application control engines (ACEs) per system |
| **Broadband** | 8,000 sessions and 4,000 Layer 2 Tunneling Protocol (L2TP) tunnels |
| **IP** | 500,000 IPv4 or 500,000 IPv6 routes with 4-GB memory<br>1,000,000 IPv4 or 1,000,000 IPv6 routes with 8- or 16-GB memory<br>Multicast: 64,000 routes and 1,000 groups |

| Feature | Specification |
|---|---|
| **QoS** | Flexible number of queues per interface:<br>• Up to 16,000 queues<br>• Three levels of hierarchy<br><100-microsecond latency for high-priority applications |
| **Real-time traffic** | 2,000 Compressed Real-Time Transport Protocol (CRTP) sessions |
| **Security** | IPsec: 4,000 tunnels<br>Firewall: 256,000 sessions<br>NAT: 256,000 sessions<br>Carrier-Grade NAT: 500,000 sessions<br>Firewall and NAT: 125,000 sessions |
| **Layer 3 VPN (L3VPN)** | 4,000 Virtual Route Forwarding (VRF) instances |
| **Generic routing encapsulation (GRE)** | 4,000 tunnels |
| **Cisco Unified Border Element (Enterprise Edition) (formerly called session border controller, or SBC)** | 10,000 sessions (each session represents a complete voice call with 14 Session Initiation Protocol [SIP] messages per call; that is, two call legs on the SBC consisting of two media legs for a bidirectional media flow and seven SIP messages per call leg) |

Table 2 lists the performance and scaling features offered by the Cisco ASR 1002-F chassis with the integrated Cisco ASR 1000 Series 2.5-Gbps ESP module.

**Table 2.** Cisco ASR 1002-F with Integrated ESP Module

| Feature | Specification |
|---|---|
| **Performance** | |
| **Up to 4 Mpps** | Variable forwarding performance, depending on features configured |
| **2 Mpps** | For the combination of the following commonly used features: IPv4 forwarding, IP Multicast, ACL, QoS, RPF, load balancing, and Sampled NetFlow |
| **Bandwidth** | |
| **2.5 Gbps** | For the combination of commonly used features later than Firewall or NAT |
| **1.0 Gbps** | For plain IPsec encryption |

Table 3 lists the performance and scaling features offered by the Cisco ASR 1000 Series 5-Gbps ESP module.

**Table 3.** Cisco ASR 1000 Series 5-Gbps ESP Module Performance and Scaling

| Feature | Specification |
|---|---|
| **Performance** | |
| **Up to 7.5 Mpps** | Variable forwarding performance, depending on features configured |
| **4 Mpps** | For the combination of the following commonly used features: IPv4 forwarding, IP Multicast, ACL, QoS, RPF, load balancing, and Sampled NetFlow |
| **Bandwidth** | |
| **5 Gbps** | For the combination of commonly used features later than Firewall or NAT<br>Shared by all Cisco ASR 1000 Series SPA Interface Processor (ASR1000-SIP10) cards |
| **1.8 Gbps** | For plain IPsec encryption |
| **Scaling** | |
| **Access control** | 4,000 unique ACLs and 25,000 ACEs per system |
| **Broadband** | 12,000 sessions and 6,000 L2TP tunnels |
| **IP** | 500,000 IPv4 or 125,000 IPv6 routes<br>Multicast: 64,000 routes and 1,000 groups |
| **QoS** | Flexible number of queues per interface: |

| Feature | Specification |
|---|---|
| | • Up to 64,000 queues<br>• Three levels of hierarchy<br>• Two Low Latency Queuing (LLQ) queues per policy, with up to 1,000 policies<br>8-kbps policing and queuing granularity<br><100-microsecond latency for high-priority applications |
| **Real-time traffic** | 2,000 CRTP sessions |
| **Security** | IPsec: 10,000 tunnels (Hardware is capable of 10,000 tunnels; currently supported: 4,000)<br>Firewall or NAT: 250,000 sessions and 50,000 sessions-per-sec setup rate<br>Carrier-Grade NAT: 500,000 sessions |
| **Layer 3 VPN (L3VPN)** | 1,000 VRF instances |
| **GRE** | 1,000 tunnels |
| **Cisco Unified Border Element (SP Edition)** | 4,000 sessions (each session represents a complete voice call with 14 SIP messages per call; that is, two call legs on the SBC consisting of two media legs for a bidirectional media flow and seven SIP messages per call leg) |

Table 4 lists the performance and scaling features offered by the Cisco ASR 1000 Series 10- and 10-N-Gbps ESP modules.

**Table 4.** Cisco ASR 1000 Series 10- and 10-N-Gbps ESP Performance and Scaling

| Feature | Specification |
|---|---|
| **Performance** | |
| **Up to 15 Mpps** | Variable forwarding performance, depending on features configured |
| **8 Mpps** | For the combination of the following commonly used features: IPv4 forwarding, IP Multicast, ACL, QoS, RPF, load balancing, and Sampled NetFlow |
| **Bandwidth** | |
| **10 Gbps** | For the combination of commonly used features + Firewall or NAT<br>Shared by all Cisco ASR 1000 SPA Interface Processor (ASR1000-SIP10) cards |
| **4 Gbps** | For plain IPsec encryption (not supported on the ASR1000-ESP10-N) |
| **Scaling** | |
| **Access control** | 4,000 unique ACLs and 50,000 ACEs per system |
| **Broadband** | 24,000 sessions and 12,000 L2TP tunnels |
| **IP** | 1,000,000 IPv4 or 500,000 IPv6 routes<br>Multicast: 64,000 routes and 1,000 groups |
| **QoS** | Flexible number of queues per interface:<br>• Up to 128,000 queues<br>• Three levels of hierarchy<br>• Two LLQ queues per policy, with up to 1,000 policies<br>8-kbps policing and queuing granularity<br><100-microsecond latency for high-priority applications |
| **Real-time traffic** | 4,000 CRTP sessions |
| **Security** | IPsec: 10,000 tunnels (not supported on the ASR1000-ESP10-N) (hardware is capable of 10,000 tunnels; currently supported: 4,000)<br>Firewall or NAT: 1,000,000 sessions and 100,000 sessions-per-sec setup rate |
| **L3VPN** | 1,000 VRF instances |
| **GRE** | 2,000 tunnels |
| **Cisco Unified Border Element (SP Edition)** | 9,000 sessions (each session represents a complete voice call with 14 SIP messages per call; that is, two call legs on the SBC consisting of media legs for a bidirectional media flow and seven SIP messages per call leg) |

Table 5 lists the performance and scaling features offered by the Cisco ASR 1000 Series 20-Gbps ESP module.

**Table 5.** Cisco ASR 1000 Series 20-Gbps ESP Performance and Scaling

| Feature | Specification |
|---|---|
| **Performance** | |
| **Up to 23 Mpps** | Variable forwarding performance, depending on features configured |
| **10.4 Mpps** | For the combination of the following commonly used features: IPv4 forwarding, IP Multicast, ACL, QoS, RPF, load balancing, and Sampled NetFlow |
| **Bandwidth** | |
| **20 Gbps** | For the combination of commonly used features + Firewall or NAT<br>Shared by all Cisco ASR 1000 SPA Interface Processor (ASR1000-SIP10) cards |
| **8 Gbps** | For plain IPsec encryption |
| **Scaling** | |
| **Access control** | 4,000 unique ACLs and 100,000 ACEs per system |
| **Broadband** | 32,000 sessions and 16,000 L2TP tunnels |
| **IP** | 4,000,000 IPv4 or 4,000,000 IPv6 routes<br>Multicast: 128,000 routes and 1,000 groups |
| **QoS** | Flexible number of queues per interface:<br>• Up to 128,000 queues<br>• Three levels of hierarchy<br>• Two LLQ queues per policy, with up to 1,000 policies<br>8-kbps policing and queuing granularity<br><100-microsecond latency for high-priority applications |
| **Real-time traffic** | 4,000 CRTP sessions |
| **Security** | IPsec: 10,000 tunnels (Hardware is capable of 10,000 tunnels; currently supported: 4,000)<br>Firewall or NAT: 2,000,000 sessions and 200,000 sessions-per-sec setup rate<br>Carrier-Grade NAT: 4,000,000 sessions |
| **L3VPN** | 4,000 VRF instances |
| **GRE** | 4,000 tunnels |
| **Cisco Unified Border Element (SP Edition)** | 64,000 sessions (each session represents a complete voice call with 14 SIP messages per call; that is, two call legs on the SBC consisting of two media legs for a bidirectional media flow and seven SIP messages per call leg) |

Table 6 lists the performance and scaling features offered by the Cisco ASR 1000 Series 40-Gbps ESP module.

**Table 6.** Cisco ASR 1000 Series 40-Gbps ESP Performance and Scaling

| Feature | Specification |
|---|---|
| **Performance** | |
| **Up to 23 Mpps** | Variable forwarding performance, depending on features configured |
| **10.4 Mpps** | For the combination of the following commonly used features: IPv4 forwarding, IP Multicast, ACL, QoS, RPF, load balancing, and Sampled NetFlow |
| **Bandwidth** | |
| **40 Gbps** | For the combination of commonly used features + Firewall or NAT<br>Shared by all Cisco ASR 1000 SPA Interface Processor (ASR1000-SIP10 or ASR1000-SIP40) cards |
| **11 Gbps** | For plain IPsec encryption |
| **Scaling** | |
| **Access control** | 4,000 unique ACLs and 100,000 ACEs per system |
| **Broadband** | 64,000 sessions and 64,000 L2TP tunnels |
| **IP** | 4,000,000 IPv4 or 4,000,000 IPv6 routes |

| Feature | Specification |
|---|---|
| | Multicast: 128,000 routes and 1,000 groups |
| **QoS** | Flexible number of queues per interface:<br>• Up to 128,000 queues<br>• Three levels of hierarchy<br>• Two LLQ queues per policy, with up to 1,000 policies<br>8-kbps policing and queuing granularity<br><100-microsecond latency for high-priority applications |
| **Real-time traffic** | 4,000 CRTP sessions |
| **Security** | IPsec: 8,000 tunnels (Hardware is capable of 10,000 tunnels; currently supported: 8,000)<br>Firewall or NAT: 2,000,000 sessions and 200,000 sessions-per-sec setup rate<br>Carrier-Grade NAT: 4,000,000 sessions |
| **L3VPN** | 8,000 VRF instances |
| **GRE** | 4,000 tunnels |
| **Cisco Unified Border Element (SP Edition)** | 64,000 sessions (each session represents a complete voice call with 14 SIP messages per call; that is, two call legs on the SBC consisting of two media legs for a bidirectional media flow and seven SIP messages per call leg) |

Table 7 lists the performance and scaling features offered by the Cisco ASR 1000 Series 100-Gbps ESP module.

**Table 7.** Cisco ASR 1000 Series 100-Gbps ESP Performance and Scaling

| Feature | Specification |
|---|---|
| **Performance** | |
| **Up to 58 Mpps** | Variable forwarding performance, depending on features configured |
| **26 Mpps** | For the combination of the following commonly used features: IPv4 forwarding, IP Multicast, ACL, QoS, RPF, load balancing, and Sampled NetFlow |
| **Bandwidth** | |
| **100 Gbps** | For the combination of commonly used features + Firewall or NAT<br>Shared by all Cisco ASR 1000 SPA Interface Processor (ASR1000-SIP10 or ASR1000-SIP40) cards |
| **29 Gbps** | For plain IPsec encryption |
| **Scaling** | |
| **Access control** | 4,000 unique ACLs and 400,000 ACEs per system |
| **Broadband** | 64,000 sessions and 64,000 L2TP tunnels<br>58,000 sessions with queues |
| **IP** | 4,000,000 IPv4 or 4,000,000 IPv6 routes (hardware is capable of 8,000,000 routes)<br>Multicast: 128,000 routes and 20,000 groups |
| **QoS** | Flexible number of queues per interface:<br>• Up to 232,000 queues<br>• Three levels of hierarchy<br>• Two LLQ queues per policy, with up to 1,000 policies<br>8-kbps policing and queuing granularity<br><100-microsecond latency for high-priority applications |
| **Real-time traffic** | 4,000 CRTP sessions |
| **Security** | IPsec: 8,000 tunnels (hardware is capable of 10,000 tunnels; currently supported: 8,000)<br>Firewall: 6,000,000 sessions and 220,000 sessions-per-sec setup rate<br>NAT: 4,000,000 sessions and 300,000 sessions-per-sec setup rate<br>Carrier-Grade NAT: 12,000,000 sessions |
| **L3VPN** | 8,000 VRF instances |
| **GRE** | 4,000 tunnels |
| **Cisco Unified Border Element (SP Edition)** | 64,000 sessions (each session represents a complete voice call with 14 SIP messages per call; that is, two call legs on the SBC consisting of two media legs for a bidirectional media flow and seven SIP messages per call leg) |

Table 8 lists the performance and scaling features offered by the Cisco ASR 1000 Series 200-Gbps ESP module.

**Table 8.** Cisco ASR 1000 Series 200-Gbps ESP Performance and Scaling

| Feature | Specification |
|---|---|
| **Performance** | |
| **Up to 130 Mpps** | Variable forwarding performance, depending on features configured |
| **50 Mpps** | For the combination of the following commonly used features: IPv4 forwarding, IP Multicast, ACL, QoS, RPF, load balancing, and Sampled NetFlow |
| **Bandwidth** | |
| **200 Gbps** | For the combination of commonly used features + Firewall or NAT<br>Shared by all Cisco ASR 1000 SPA Interface Processor (ASR1000-SIP40) cards |
| **78 Gbps** | For plain IPsec encryption (1400-byte packets) |
| **Scaling** | |
| **Access control** | 4,000 unique ACLs and 400,000 ACEs per system |
| **Broadband** | 64,000 sessions, 64,000 L2TP tunnels<br>58,000 sessions with queues |
| **IP** | 4,000,000 IPv4 or 4,000,000 IPv6 routes<br>Multicast: 128,000 routes, 40,000 groups |
| **QoS** | Up to 464,000 queues |
| **Real-time traffic** | 4,000 CRTP sessions |
| **Security** | IPsec: 8000 tunnels<br>Firewall: 6,000,000 sessions and 220,000 sessions-per-sec setup rate<br>NAT: 4,000,000 sessions and 300,000 sessions-per-sec setup rate<br>Carrier-Grade NAT: 12,000,000 sessions |
| **L3VPN** | 8,000 VRF instances |
| **GRE** | 4,000 Tunnels |
| **Cisco Unified Border Element (SP Edition)** | 64,000 sessions (each session represents a complete voice call with 14 SIP messages per call; that is, two call legs on the SBC consisting of two media legs for a bidirectional media flow and seven SIP messages per call leg) |

Table 9 lists the performance and scaling features offered by the Cisco ASR 1002-X chassis with an integrated ESP module.

**Table 9.** Cisco ASR 1002-X with Integrated 36-Gbps ESP Module and 8-GB Memory

| Feature | Specification |
|---|---|
| **Performance** | |
| **Up to 30 Mpps** | Variable forwarding performance, depending on features configured |
| **19 Mpps** | For the combination of the following commonly used features: IPv4 forwarding, IP Multicast, ACL, QoS, Reverse Path Forwarding (RPF), load balancing, and Sampled NetFlow |
| **Bandwidth** | |
| **36 Gbps** | For the combination of commonly used features later than Firewall or NAT |
| **4 Gbps** | For plain IPsec encryption |
| **Scaling** | |
| **Access control** | 4,000 unique ACLs and 25,000 ACEs per system |
| **Broadband** | 29,000 sessions and 16,000 L2TP tunnels |
| **IP** | 500,000 IPv4 or 500,000 IPv6 routes with 4-GB memory<br>1,000,000 IPv4 or 1,000,000 IPv6 routes with 8-GB memory<br>3,500,000 IPv4 or 3,000,000 IPv6 routes with 16-GB memory<br>Multicast: 64,000 routes and 1,000 groups |

| Feature | Specification |
|---|---|
| **QoS** | Flexible number of queues per interface:<br>• Up to 128,000 queues<br>• Three levels of hierarchy<br>• Two LLQ queues per policy, with up to 4,000 policies<br>8-kbps policing and queuing granularity<br><100-microsecond latency for high-priority applications |
| **Real-time traffic** | 2,000 CRTP sessions |
| **Security** | IPsec: 4,000 tunnels<br>Firewall: 2,000,000 sessions<br>NAT: 2,000,000 sessions<br>Carrier-Grade NAT: 4,000,000 sessions<br>200,000 sessions-per-sec setup rate |
| **L3VPN** | 4,000 VRF instances |
| **GRE** | 4,000 tunnels |
| **Cisco Unified Border Element (Enterprise Edition** | 10,000 sessions (each session represents a complete voice call with 14 SIP messages per call; that is, two call legs on the SBC consisting of two media legs for a bidirectional media flow and seven SIP messages per call leg) |

Please refer to the Cisco ASR 1000 Series Routing Processor data sheet for a list of software features and benefits applicable to broadband, service provider edge, and enterprise deployments.

## Product Specifications

Tables 10 and 11 list specifications of the integrated ESP modules in the Cisco ASR 1001 and ASR 1002-F chassis, respectively. Table 12 lists the specifications of the Cisco ASR 1000 Series 5-, 10-, 10-N-, 20-, 40-, and 100-Gbps ESP modules, and Table 13 lists the specifications of the integrated ESP modules in the Cisco ASR 1002-X.

**Table 10.** Specifications of Integrated ESP Module in Cisco ASR 1001 Chassis

| Feature | Specification |
|---|---|
| **Product compatibility** | The ESP module is integrated in the Cisco ASR 1001 chassis. |
| **Software compatibility** | Cisco IOS XE Software Release 3.2.S or later is required (minimum software release for the integrated ESP module in the Cisco ASR 1001 chassis). |
| **Protocols** | Refer to Cisco IOS XE Software Release 3.2S (or later) protocol support. |
| **Connectivity** | Refer to Cisco ASR 1000 Series SIP data sheet for SPA support. The SIP is integrated in the Cisco ASR 1001 chassis. |
| **Memory** | 256-MB Cisco QuantumFlow Processor Resource Memory, 5-Mb ternary content addressable memory (TCAM), and 64-MB packet buffet memory. The integrated ESP shares the same control memory on the route processor. |
| **Reliability and availability** | Software redundancy support: Yes<br>Hardware redundancy support: No<br>Support for online insertion and removal (OIR)<br>Support for Nonstop Forwarding (NSF) and Stateful Switchover (SSO) |
| **MIBs** | RFC 2737 compliant |
| **Network management** | Network management through Cisco ASR 1000 Series Route Processor:<br>• Telnet (command-line interface [CLI])<br>• Console port (through the CLI)<br>• SNMP (RFC 2665) |

| Feature | Specification | | | | |
|---|---|---|---|---|---|
| **Status LED descriptions** | No | LED Label | LED | Color-State | Behavior Description |
| | | PWR | Power | Solid green | All power rails are within specifications |
| | | | | Off | Off, the route is in standby mode |
| | | STAT | System status | Solid green | Cisco IOS Software has successfully booted |
| | | | | Yellow | BOOT ROMmon has successfully loaded |
| | | | | Red | System failure; on power up, turned off by software |
| | | ACTV | Activity | Green | Lit when this is the active route processor |
| | | STBY | Standby | Yellow | Lit when this is the standby route processor |
| **Physical dimensions (H x W x D)** | Not applicable: The ESP module is integrated in the Cisco ASR 1001 chassis. | | | | |
| **Power** | Not applicable: The ESP module is integrated in the Cisco ASR 1001 chassis. | | | | |
| **Approvals and compliance** | Same as for Cisco ASR 1001 chassis because the ESP module is integrated in the chassis | | | | |
| **Environmental** | Same as for Cisco ASR 1001 chassis because the ESP module is integrated in the chassis | | | | |

**Table 11.** Specifications of Integrated ESP Module in Cisco ASR 1002-F Chassis

| Feature | Specification | | | | |
|---|---|---|---|---|---|
| **Product compatibility** | For 2.5-Gbps Cisco ASR 1000 ESP: Cisco ASR 1002-F chassis only (integrated in the chassis) | | | | |
| **Software compatibility** | Cisco IOS XE Software Release 2.4 or later (minimum software release for the integrated 2.5-Gbps ESP in the Cisco ASR 1002-F chassis) | | | | |
| **Protocols** | Refer to Cisco IOS XE Software Release 2.4 (or later) protocol support. | | | | |
| **Connectivity** | Refer to Cisco ASR 1000 Series SIP data sheet for SPA support. The SIP is integrated in the Cisco ASR 1002-F chassis. | | | | |
| **Memory** | For ESP integrated in the Cisco ASR 1002-F chassis: Time-Based Charging (TBC) | | | | |
| **Reliability and availability** | Software redundancy support: Yes<br>Hardware redundancy support: No<br>Support for OIR<br>Support for NSF and SSO | | | | |
| **MIBs** | RFC 2737 compliant | | | | |
| **Network management** | Network management through Cisco ASR 1000 Series Route Processor:<br>• Telnet (CLI)<br>• Console port (through the CLI)<br>• SNMP (RFC 2665) | | | | |
| **Status LED descriptions** | No | LED Label | LED | Color-State | Behavior Description |
| | | PWR | Power | Solid green | All power rails are within specifications |
| | | | | Off | Off, the route is in standby mode |
| | | STAT | System status | Solid green | Cisco IOS Software has successfully booted |
| | | | | Yellow | BOOT ROMmon has successfully loaded |
| | | | | Red | System failure; on power up, turned off by software |
| | | ACTV | Activity | Green | Lit when this is the active route processor |
| | | STBY | Standby | Yellow | Lit when this is the standby route processor |
| **Physical dimensions (H x W x D)** | Not applicable: The ESP module is integrated in the Cisco ASR 1002-F chassis. | | | | |
| **Power** | Not applicable: The ESP module is integrated in the Cisco ASR 1002-F chassis. | | | | |
| **Approvals and compliance** | Same as for Cisco ASR 1002-F chassis because the ESP module is integrated in the chassis | | | | |
| **Environmental** | Same as for Cisco ASR 1002-F chassis because the ESP module is integrated in the chassis | | | | |

**Table 12.** Specifications of Cisco ASR 1000 Series 5- 10-, 10-N-, 20-, 40-, 100-, and 200-Gbps ESP Modules

| Feature | Specification |
|---|---|
| **Product compatibility** | For 2.5- and 5-Gbps integrated ESP: Cisco ASR 1001 Router chassis only<br>For 5-Gbps Cisco ASR 1000 ESP: Cisco ASR 1002 Router chassis only<br>For 10-Gbps Cisco ASR 1000 ESP: Cisco ASR 1002, ASR 1004, and ASR 1006 Router chassis<br>For 10-N-Gbps Cisco ASR 1000 ESP: Cisco ASR 1002, ASR 1004, and ASR 1006 Router chassis<br>For 20-Gbps Cisco ASR 1000 ESP: Cisco ASR 1004 and ASR 1006 Router chassis<br>For 40-Gbps Cisco ASR 1000 ESP: Cisco ASR 1004, ASR 1006, and ASR 1013 Router chassis<br>For 100-Gbps Cisco ASR 1000 ESP: Cisco ASR 1006 and ASR 1013 Router chassis; requires the Cisco ASR 1000 1600W AC or DC Power Supply (ASR1013/06-PWR-AC or ASR1013/06-PWR-DC, respectively)<br>For 200-Gbps Cisco ASR 1000 ESP: Cisco ASR 1013 Router chassis only |
| **Software compatibility** | Cisco IOS XE Software Release 2.1 (minimum software release for 5- and 10-Gbps ESPs)<br>Cisco IOS XE Software Release 2.2 or later (minimum software release for 20-Gbps ESP)<br>Cisco IOS XE Software Release 3.1.0S or later (minimum software release for 40-Mbps ESP)<br>Cisco IOS XE Software Release 3.2.0S or later (minimum) software release for 40-Gbps ESP support on Cisco ASR 1004<br>Cisco IOS XE Software Release 3.2.0S or later (minimum software release for 2.5- and 5-Gbps integrated ESP support on Cisco ASR 1001)<br>Cisco IOS XE Software Release 3.7.1S or later (minimum) software release for 100-Gbps ESP support<br>Cisco IOS XE Software Release 3.10.0S or later (minimum) software release for 200-Gbps ESP support |
| **Protocols** | Refer to Cisco IOS XE Software Releases 2.1, 2.2, 3.1.0S, and 3.1.0S (or later) protocol support |
| **Connectivity** | Refer to Cisco ASR 1000 Series SIP data sheet for SPA support |
| **Memory** | For 2.5- and 5-Gbps integrated ESP in Cisco ASR 1001: 256-MB Cisco QuantumFlow Processor, 1-GB DRAM, 5-Mb TCAM, and 64-MB packet buffer memory<br>For 5-Gbps Cisco ASR 1000 ESP: 256-MB Cisco QuantumFlow Processor, 1-GB DRAM, 5-Mb TCAM, and 64-MB packet buffer memory<br>For 10-Gbps Cisco ASR 1000 ESP: 512-MB Cisco QuantumFlow Processor, 2-GB DRAM, 10-Mb TCAM, and 128-MB packet buffer memory<br>For 10-N-Gbps Cisco ASR 1000 ESP: 512-MB Cisco QuantumFlow Processor, 2-GB DRAM, 10-Mb TCAM, and 128-MB packet buffer memory<br>For 20-Gbps Cisco ASR 1000 ESP: 1-GB Cisco QuantumFlow Processor, 4-GB DRAM, 40-Mb TCAM, and 256-MB packet buffer memory<br>For 40-Gbps Cisco ASR 1000 ESP: 1-GB Cisco QuantumFlow Processor, 8-GB DRAM, 40-Mb TCAM, and 256-MB packet buffer memory<br>For 100-Gbps Cisco ASR 1000 ESP: 4-GB Cisco QuantumFlow Processor, 16-GB DRAM, 80-Mb TCAM, and 1-GB packet buffer memory<br>For 200-Gbps Cisco ASR 1000 ESP: 8-GB Cisco QuantumFlow Processor, 32-GB DRAM, 160-Mb TCAM, and 2-GB packet buffer memory |
| **Reliability and availability** | For 10- 10-N-, 20-, 40-, 100-, and 200-Gbps Cisco ASR 1000 ESPs: High-availability 1 + 1 redundancy in dual ESP configuration in combination with Cisco ASR 1006 or ASR 1013 Router chassis<br>Support for OIR<br>Support for NSF and SSO<br>Support for In-Service Software Upgrade (ISSU) with Cisco ASR 1006 and ASR 1013 in combination with dual route processors and dual ESPs |
| **MIBs** | RFC 2737 compliant |
| **Network management** | Network management through Cisco ASR 1000 Series Route Processor:<br>• Telnet (CLI)<br>• Console port (through the CLI)<br>• SNMP (RFC 2665) |
| **Status LED descriptions** | No: — / LED Label: PWR / LED: Power / Color-State: Solid green / Behavior Description: All power rails are within specifications<br>No: — / LED Label: — / LED: — / Color-State: Off / Behavior Description: Off, the route is in standby mode<br>No: — / LED Label: STAT / LED: System status / Color-State: Solid green / Behavior Description: Cisco IOS Software has successfully booted<br>No: — / LED Label: — / LED: — / Color-State: Yellow / Behavior Description: BOOT ROMmon has successfully loaded<br>No: — / LED Label: — / LED: — / Color-State: Red / Behavior Description: System failure; on power up, turned off by software |

| Feature | Specification | | | | |
|---|---|---|---|---|---|
| | | ACTV | Activity | Green | Lit when this is the active route processor |
| | | STBY | Standby | Yellow | Lit when this is the standby route processor |
| **Physical dimensions (H x W x D)** | 0.92 x 16.7 x 14.19 in. (0.02 x 0.428 x 0.36m) | | | | |
| **Power** | For 5-, 10-, and 10-N-Gbps Cisco ASR 1000 ESPs: 188W maximum (typical: 140W)<br>For 20-Gbps Cisco ASR 1000 ESP: 230W maximum (typical: 150W)<br>For 40-Gbps Cisco ASR 1000 ESP: 267W maximum (typical: 227W)<br>For 100-Gbps Cisco ASR 1000 ESP: 450W maximum (typical: 390W)<br>For 200-Gbps Cisco ASR 1000 ESP: 938W maximum (typical: 785W) | | | | |
| **Approvals and compliance** | **Safety**<br>• UL60950 and CAN/CSA-C22.2 No. 60950. Information technology equipment<br>• AS/NZS 60950<br>• IEC/EN 60950 Information technology equipment<br>• 73/23/EEC<br>**Electromagnetic Emissions Certification**<br>• AS/NZ 3548: 1995 (including AMD I + II) Class A<br>• EN55022: 1998 Class A<br>• CISPR 22: 1997<br>• EN55022: 1994 (including AMD I + II)<br>• 47 CFR Part 15: 2000 (FCC) Class A<br>• VCCI V-3/01.4 Class A<br>• CNS-13438: 1997 Class A<br>• GR1089: 1997 (including Rev. 1: 1999)<br>**Immunity**<br>• EN300386: 2000-TNE EMC requirements; product family standard; high priority of service; central office and non–central office locations<br>• EN50082-1: 1992/1997<br>• EN50082-2: 1995-Generic Immunity Standard, Heavy Industrial<br>• CISPR24: 1997<br>• EN55024: 1998-Generic ITE immunity standard<br>• EN61000-4-2: 1995 + AMD I + II ESD, Level 4/8 kV contact, 15 kV air<br>• IEC-1000-4-3: 1995 + AMD 1-Radiated Immunity, 10 V/m<br>• IEC-1000-4-4: 1995-Electrical Fast Transients, Level 4/4 kV/B<br>• IEC-1000-4-5: 1995 + AMD 1-DC Surge-Class 3; AC Surge-Class 4<br>• EN61000-4-6: 1996 + AMD 1-RF conducted immunity, 10V rms<br>• EN61000-4-11: 1995-Voltage Dips and Sags<br>• ETS300 132-2: 1996 + corrigendum, December 1996<br>• GR1089:1997 (including Rev1: 1999)<br>**Network Equipment Building Standards**<br>The module meets the following Networking Equipment Building Standards (NEBS):<br>• GR-1089-CORE<br>• GR-63-CORE<br>• European Telecommunication Standards Institute (ETSI)<br>• ETSI 300 386-1 - Levels for equipment with a "high priority of service" that is installed in "locations other than telecommunication centers"<br>• ETSI 300 386-2:1997 - Levels for equipment with a "high priority of service" that is installed in "locations other than telecommunication centers"<br>• ETSI 300 132-2: December 1994 - Power supply interfaces at the input to telecommunications equipment Sections 4.8 and 4.9 | | | | |

| Feature | Specification |
|---|---|
| **Environmental** | Storage temperature: –38 to 150℉ (–40 to 70℃)<br>Operating temperature, nominal: 41 to 104℉ (5 to 4 0℃)<br>Operating temperature, short-term: 23 to 131℉ (–5 t o 55℃)<br>Storage relative humidity (RH): 5 to 95% RH<br>Operating humidity, nominal: 5 to 85% RH<br>Operating humidity, short-term: 5 to 90% RH<br>Operating altitude: –60 to 4000m (up to 2000m conforms to IEC/EN/UL/CSA 60950 requirements) |

**Table 13.** Specifications of Integrated ESP Module in Cisco ASR 1002-X Chassis

| Feature | Specification | | | |
|---|---|---|---|---|
| **Product compatibility** | The ESP module is integrated in the Cisco ASR 1002-X chassis. | | | |
| **Software compatibility** | Cisco IOS XE Software Release 3.7.0S or later | | | |
| **Protocols** | Refer to Cisco IOS XE Software Release 3.7.0S (or later) protocol support. | | | |
| **Connectivity** | Refer to Cisco ASR 1000 Series SIP data sheet for SPA support. The SIP is integrated in the Cisco ASR 1002-X chassis. | | | |
| **Memory** | 1-GB Cisco QuantumFlow Processor Resource Memory, 40-Mb TCAM, and 512-MB packet buffet memory. The integrated ESP shares the same control memory on the route processor. | | | |
| **Reliability and availability** | Software redundancy support: Yes<br>Hardware redundancy support: No<br>Support for OIR<br>Support for NSF and SSO | | | |
| **MIBs** | RFC 2737 compliant | | | |
| **Network management** | Network management through Cisco ASR 1000 Series Route Processor:<br>• Telnet (CLI)<br>• Console port (through the CLI)<br>• SNMP (RFC 2665) | | | |
| **Status LED descriptions** | LED Label | LED | Color-State | Behavior Description |
| | PWR | Power | Solid green | All power rails are within specifications |
| | | | Off | Off, the route is in standby mode |
| | STAT | System status | Solid green | Cisco IOS Software has successfully booted |
| | | | Yellow | BOOT ROMmon has successfully loaded |
| | | | Red | System failure; on power up, turned off by software |
| **Physical dimensions (H x W x D)** | Not applicable: The ESP module is integrated in the Cisco ASR 1002-X chassis | | | |
| **Power** | Not applicable: The ESP module is integrated in the Cisco ASR 1002-X chassis | | | |
| **Approvals and compliance** | Same as for other ESP modules | | | |
| **Environmental** | Same as for other ESP modules | | | |

## System Requirements

Table 14 gives system requirements.

**Table 14.** System Requirements

| System | Requirement |
|---|---|
| **Hardware** | 2.5- and 5-Gbps ESPs integrated in Cisco ASR 1001 chassis; default performance is 2.5 Gbps and can be upgraded to 5 Gbps with a license through software activation<br>2.5-Gbps ESP integrated in Cisco ASR 1002-F chassis<br>5-, 10-, 20-, and 36-Gbps ESPs integrated in Cisco ASR 1002-X chassis; default performance is 5 Gbps and can be upgraded to 10, 20, or 36 Gbps with a license through software activation<br>For 5-Gbps Cisco ASR 1000 ESP: Cisco ASR 1002 Router chassis only<br>For 10- and 10-N-Gbps Cisco ASR 1000 ESPs: Cisco ASR 1002 Router chassis<br>or<br>Cisco ASR 1004 Router chassis with one instance of Cisco ASR 1000 Series Route Processor and one instance of Cisco ASR 1000 Series SPA Interface Processor<br>or<br>Cisco ASR 1006 Router chassis with at least one instance of Cisco ASR 1000 Series Route Processor and one instance of Cisco ASR 1000 Series SPA Interface Processor<br>For 20-Gbps Cisco ASR 1000 ESP: Cisco ASR 1004 Router chassis with one instance of Cisco ASR 1000 Series Route Processor and one instance of Cisco ASR 1000 Series SPA Interface Processor<br>or<br>Cisco ASR 1006 Router chassis with at least one instance of Cisco ASR 1000 Series Route Processor and one instance of Cisco ASR 1000 Series SPA Interface Processor<br>For 40-Gbps Cisco ASR 1000 ESP: Cisco ASR 1006 Router chassis with at least one instance of Cisco ASR 1000 Series Route Processor and one instance of Cisco ASR 1000 Series SPA Interface Processor<br>or<br>Cisco ASR 1004 Router chassis with at least one instance of Cisco ASR 1000 Series Route Processor and one instance of Cisco ASR 1000 Series SPA Interface Processor<br>or<br>Cisco ASR 1013 Router chassis with at least one instance of Cisco ASR 1000 Series Route Processor and one instance of Cisco ASR 1000 Series SPA Interface Processor<br>For 100-Gbps Cisco ASR 1000 ESP: Cisco ASR 1006 Router chassis with at least one instance of Cisco ASR 1000 Series Route Processor and one instance of Cisco ASR 1000 Series SPA Interface Processor<br>or<br>Cisco ASR 1013 Router chassis with at least one instance of Cisco ASR 1000 Series Route Processor and one instance of Cisco ASR 1000 Series SPA Interface Processor<br>For 200-Gbps Cisco ASR 1000 ESP: Cisco ASR 1013 Router chassis with at least one instance of Cisco ASR 1000 Series Route Processor and one instance of Cisco ASR 1000 Series SPA Interface Processor |
| **Software** | Cisco IOS XE Software Release 2.1 (for 5- and 10-Gbps ESPs only) or later (10-N- and 20-Gbps ESPs: Release 2.2 or later)<br>Cisco IOS XE Software Release 2.4 (for 2.5-Gbps ESP integrated in the Cisco ASR 1002-F chassis)<br>Cisco IOS XE Software Release 3.1.0S (for 40-Gbps ESP) or later<br>Cisco IOS XE Software Release 3.2.0S (for 40-Gbps ESP support on Cisco ASR 1004) or later<br>Cisco IOS XE Software Release 3.2.0S (for integrated ESP in Cisco ASR 1001 chassis) or later<br>Cisco IOS XE Software Release 3.7.0S (for integrated ESP in Cisco ASR 1002-X chassis) or later<br>Cisco IOS XE Software Release 3.7.1S or later for 100-Gbps ESP<br>Cisco IOS XE Software Release 3.10.0S or later for 200-Gbps ESP |

## Ordering Information

To place an order, visit the Cisco Ordering Home Page at http://www.cisco.com/en/US/ordering/index.shtml and refer to Table 15. For further information, please refer to the Cisco ASR 1000 Series Aggregation Services Routers Orderability product bulletin.

Please refer to Tables 16 through 24 for compatible hardware and Table 25 for compatible software.

To download software, visit the Cisco Software Center at: http://www.cisco.com/public/sw-center.

**Table 15.** Ordering Information

| Product Name | Part Number |
|---|---|
| **Cisco ASR 1000 Embedded Services Processor 5Gbps** | ASR1000-ESP5 |
| **Cisco ASR 1000 Embedded Services Processor 10Gbps** | ASR1000-ESP10 |
| **Cisco ASR 1000 Embedded Services Processor 10Gbps noncrypto** | ASR1000-ESP10-N |
| **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 |

**Table 16.** Cisco ASR 1000 Series Integrated ESP in Cisco ASR 1001 Chassis Compatible Hardware

| Product Name | Part Number |
|---|---|
| **Cisco ASR 1001 Router Chassis (ESP integrated; upgradable from 2.5-Gbps to 5-Gbps via software activated license)** | ASR1001 |
| **Cisco ASR 1001 Router Chassis (ESP integrated; upgradable from 2.5-Gbps to 5-Gbps via software activated license to 5-Gbps) with integrated daughter card with two OC3 POS ports** | ASR1001-2XOC3POS |
| **Cisco ASR 1001 Router Chassis (ESP integrated; upgradable from 2.5-Gbps to 5-Gbps via software activated license to 5-Gbps) with integrated daughter card with four T3 ports** | ASR1001-4XT3 |
| **Cisco ASR 1001 Router Chassis (ESP integrated; upgradable from 2.5-Gbps to 5-Gbps via software activated license to 5-Gbps) with integrated daughter card with four 1GE ports** | ASR1001-4X1GE |
| **Cisco ASR 1001 Router Chassis (ESP integrated; upgradable from 2.5-Gbps to 5-Gbps via software activated license to 5-Gbps) with integrated daughter card with 160GB Hard Disk Drive** | ASR1001-HDD |
| **Cisco ASR 1001 Router Chassis (ESP integrated; upgradable from 2.5-Gbps to 5-Gbps via software activated license to 5-Gbps) with integrated daughter card with eight channelized T1E1 ports** | ASR1001-8XCHT1E1 |

**Table 17.** Cisco ASR 1000 Series Integrated ESP in Cisco ASR 1002-F Chassis Compatible Hardware

| Product Name | Part Number |
|---|---|
| **Cisco ASR 1002-Fixed Router Chassis (ESP2.5 integrated)** | ASR1002-F |

**Table 18.** Cisco ASR 1000 Series Integrated ESP in Cisco ASR 1002-X Chassis Compatible Hardware

| Product Name | Part Number |
|---|---|
| **Cisco ASR 1002-X Router Chassis** | ASR1002-X |

**Table 19.** 5-Gbps Cisco ASR 1000 Series ESP (ASR1000-ESP5) Compatible Hardware

| Product Name | Part Number |
|---|---|
| **Cisco ASR 1002 Router Chassis** | ASR1002 |

**Table 20.** 10- and 10-N-Gbps Cisco ASR 1000 Series (ASR1000-ESP10 and ASR1000-ESP10-N, respectively) ESP Compatible Hardware

| Product Name | Part Number |
|---|---|
| **Cisco ASR 1002 Router Chassis** | ASR1002 |
| **Cisco ASR 1004 Router Chassis** | ASR1004 |
| **Cisco ASR 1006 Router Chassis*** | ASR1006 |
| **Cisco ASR 1000 Route Processor 1, 2GB DRAM** | ASR1000-RP1 |
| **Cisco ASR 1000 Route Processor 2, 8GB DRAM** | ASR1000-RP2 |
| **Cisco ASR 1000 SPA Interface Processor 10** | ASR1000-SIP10 |

* Supports 1 + 1 redundancy when configured with two 10-Gbps Cisco ASR 1000 ESP modules.

**Table 21.** 20-Gbps Cisco ASR 1000 Series ESP (ASR1000-ESP20) Compatible Hardware

| Product Name | Part Number |
|---|---|
| **Cisco ASR 1004 Router Chassis** | ASR1004 |
| **Cisco ASR 1006 Router Chassis*** | ASR1006 |
| **Cisco ASR 1000 Route Processor 1, 2GB DRAM** | ASR1000-RP1 |
| **Cisco ASR 1000 Route Processor 2, 8GB DRAM** | ASR1000-RP2 |
| **Cisco ASR 1000 SPA Interface Processor 10** | ASR1000-SIP10 |

* Supports 1 + 1 redundancy when configured with two 20-Gbps Cisco ASR 1000 ESP modules.

**Table 22.** 40-Gbps Cisco ASR 1000 Series ESP (ASR1000-ESP40) Compatible Hardware

| Product Name | Part Number |
|---|---|
| **Cisco ASR 1004 Router Chassis*** | ASR1004 |
| **Cisco ASR 1006 Router Chassis*** | ASR1006 |
| **Cisco ASR 1013 Router Chassis*** | ASR1013 |
| **Cisco ASR 1000 Route Processor 2, 8GB DRAM** | ASR1000-RP2 |
| **Cisco ASR 1000 SPA Interface Processor 10** | ASR1000-SIP10 |
| **Cisco ASR 1000 SPA Interface Processor 40** | ASR1000-SIP40 |
| **Cisco ASR 1000 Fixed Ethernet Line Card, 2x10GE + 20x1GE** | ASR1000-2T+20X1GE |

* Supports 1 + 1 redundancy when configured with two 40-Gbps Cisco ASR 1000 ESP modules.

**Table 23.** 100-Gbps Cisco ASR 1000 Series ESP (ASR1000-ESP100) Compatible Hardware

| Product Name | Part Number |
|---|---|
| **Product Name** | Part Number |
| **Cisco ASR 1006 Router Chassis*** | ASR1006 |
| **Cisco ASR 1013 Router Chassis*** | ASR1013 |
| **Cisco ASR 1000 Route Processor 2, 8GB DRAM** | ASR1000-RP2 |
| **Cisco ASR 1000 SPA Interface Processor 10** | ASR1000-SIP10 |
| **Cisco ASR 1000 SPA Interface Processor 40** | ASR1000-SIP40 |
| **Cisco ASR 1000 Fixed Ethernet Line Card, 2x10GE + 20x1GE** | ASR1000-2T+20X1GE |
| **Cisco ASR1000 1600w AC Power Supply** | ASR1013/06-PWR-AC |
| **Cisco ASR1000 1600w DC Power Supply** | ASR1013/06-PWR-DC |

* Supports 1 + 1 redundancy when configured with two 100-Gbps Cisco ASR 1000 ESP modules.

**Table 24.** 200-Gbps Cisco ASR 1000 Series ESP (ASR1000-ESP200) Compatible Hardware

| Product Name | Part Number |
|---|---|
| **Cisco ASR 1013 Router Chassis*** | ASR1013 |
| **Cisco ASR 1000 Route Processor 2, 8GB DRAM** | ASR1000-RP2 |
| **Cisco ASR 1000 SPA Interface Processor 40** | ASR1000-SIP40 |
| **Cisco ASR 1000 Fixed Ethernet Line Card, 2x10GE + 20x1GE** | ASR1000-2T+20X1GE |
| **Cisco ASR1000 1600w AC Power Supply** | ASR1013/06-PWR-AC |
| **Cisco ASR1000 1600w DC Power Supply** | ASR1013/06-PWR-DC |

* Supports 1 + 1 redundancy when configured with two 200-Gbps Cisco ASR 1000 ESP modules.

**Table 25.** Compatible Software

| Product Name | Part Number |
|---|---|
| **Cisco ASR 1000 Series RP1 IP Base without Crypto** | SASR1R1-IPB-21SR (for ESP5 and ESP10 only); and SASR1R1-IPB-22SR; or higher |
| **Cisco ASR 1000 Series RP1 IP Base** | SASR1R1-IPBK9-21SR (for ESP5 and ESP10 only); SASR1R1-IPBK9-22SR; or higher |
| **Cisco ASR 1000 Series RP1 Advanced IP Services without Crypto** | SASR1R1-AIS-22SR; or higher |
| **Cisco ASR 1000 Series RP1 Advanced IP Services** | SASR1R1-AISK9-21SR (for ESP5 and ESP10 only); and SASR1R1-AISK9-22SR; or higher |
| **Cisco ASR 1000 Series RP1 Advanced Enterprise Services** | SASR1R1-AESK9-21SR (for ESP5 and ESP10 only); and SASR1R1-AESK9-22SR; or higher |
| **Cisco ASR 1000 Series RP1 Advanced Enterprise Services without Crypto** | SASR1R1-AES-22SR; or higher |
| **Cisco ASR 1000 Series RP2 IP Base without Crypto** | SASR1R2-IPB-23SR; or higher |
| **Cisco ASR 1000 Series RP2 IP Base** | SASR1R2-IPBK9-23SR; or higher |
| **Cisco ASR 1000 Series RP2 Advanced IP Services without Crypto** | SASR1R2-AIS-23SR; or higher |
| **Cisco ASR 1000 Series RP2 Advanced IP Services** | SASR1R2-AISK9-23SR; or higher |
| **Cisco ASR 1000 Series RP2 Advanced Enterprise Services** | SASR1R2-AESK9-23SR; or higher |
| **Cisco ASR 1000 Series RP2 Advanced Enterprise Services without Crypto** | SASR1R2-AES-23SR; or higher |

**Note:** Cisco ASR 1002-F chassis with the integrated ESP module offering up to 2.5 Gbps is supported as of Cisco IOS XE Software Release 2.4 and therefore requires as a minimum the Cisco IOS XE Software Release 2.4. Cisco ASR 1001 chassis with an integrated ESP module is supported as of Cisco IOS XE Software Release 3.2S. Cisco ASR 1002-X chassis with an integrated ESP module is supported as of Cisco IOS XE Software Release 3.7S. For information about the software and feature licenses supported on the Cisco ASR 1001 and ASR 1002-X, please refer to the Cisco ASR 1000 Software Activation product bulletin.

## Service and Support

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 can help you protect your network investment, optimize network operations, and prepare your network for new applications to extend network intelligence and the power of your business. For more information about Cisco Services, refer to Cisco Technical Support Services or Cisco Advanced Services.

## For More Information

For more information about the Cisco ASR 1000 Series or the ESPs, visit http://www.cisco.com/go/asr1000 or contact your local Cisco account representative.

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