Cisco ASR 1000 Series Embedded Services Processors

Product Overview

The Cisco® ASR 1000 Series Embedded Service Processors (ESPs) are based on the innovative, industry-leading Cisco QuantumFlow Processor for next-generation forwarding and queuing in silicon. These modules use the first generation of the hardware and software of the Cisco QuantumFlow Processor architecture.

The 5-, 10-, 10-N- 20- and 40-Gbps Cisco ASR 1000 Series ESPs (part numbers ASR1000-ESP5, ASR1000-ESP10, ASR1000-ESP10-N, ASR1000-ESP20, and ASR1000-ESP40, respectively) provide five 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 ASR 1001 comes with a nonmodular, fixed ESP with throughput of 2.5-Gbps which is upgradable with a software activated performance upgrade license to 5-Gbps.

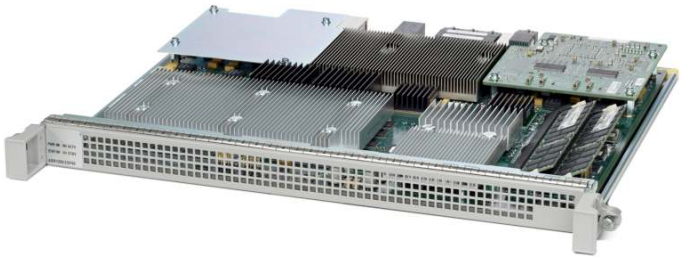
The Cisco ASR 1000 Series 10-N-Gbps ESP (ASR1000-ESP10-N) is the nonencryption version of the Cisco ASR 1000 Series 10-Gbps ESP (ASR1000-ESP10). The Cisco ASR 1000 Series 10-N-Gbps ESP can only support noncrypto Cisco IOS® Software images and will never support encryption capabilities such as IP Security (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 are the two chassis that support the 2.5-Gbps ESP, which is integrated in the chassis. The Cisco ASR 1001 is upgradable with a software activated performance upgrade license to 5-Gbps. There is no need for an additional hardware component to achieve a higher throughput of up to 5-Gbps on the Cisco ASR 1001. With the enforced performance upgrade license (part number FLS-ASR1001-5G), the customer can easily upgrade via a license only. For details on the Cisco ASR 1000 IOS XE software image and licenses including the software activation which is supported at first time customer shipment (FCS) on Cisco ASR 1001, please refer the product bulletin “Cisco ASR 1000 Series Software Activation”. 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 Router chassis. The Cisco ASR 1000 Series 10-Gbps ESP (ASR1000-ESP10 and ASR1000-ESP10-N; refer to Figure 1) supports 10-Gbps bandwidth, is supported on Cisco ASR1002, Cisco ASR1004, and Cisco ASR1006, and can optionally be deployed in customer networks that require 1+1 hardware redundancy with Cisco ASR1004 and Cisco ASR 1006. The Cisco ASR 1000 Series 20-Gbps ESP (ASR1000-ESP20) supports 20-Gbps bandwidth, 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, 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.

Performance highlights of the 20- and 40-Gbps ESPs include hardware-assisted policing; encryption capability of 8 and 11 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 is rated for 1.8 Gbps and the 2.5-Gbps ESP integrated on the Cisco ASR1002-F chassis is rated for 1.0 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 shown)



Applications

The Cisco 2.5-, 5-, 10-, 10-N-, 20-, and 40-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 32,000 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 40 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 11-Gbps IP Security [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 sevices 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, or 40 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 ESP Module

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/NAT (FW/NAT)
1.8 Gbps	For the combination of commonly used features later than IPsec* encryption

Table 2 lists the performance and scaling features offered by the Cisco ASR 1002-F chassis with the integrated 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, Reverse Path Forwarding (RPF), load balancing, and Sampled NetFlow
Bandwidth	
2.5 Gbps	For the combination of commonly used features later than Firewall/NAT (FW/NAT)
1.0 Gbps	For the combination of commonly used features later than 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, Reverse Path Forwarding (RPF), load balancing, and Sampled NetFlow
Bandwidth	
5 Gbps	For the combination of commonly used features later than Firewall/NAT (FW/NAT) Shared by all Cisco ASR 1000 Series SPA Interface Processor (ASR1000-SIP10) cards
1.8 Gbps	For the combination of commonly used features later than IPsec* encryption
Scaling	
Access control	4,000 unique ACLs and 25,000 application control engines (ACEs) per system
Broadband	12,000 sessions and 6,000 Layer 2 Tunneling Protocol (L2TP) tunnels
IP	500,000 IPv4 and 125,000 IPv6 routes Multicast: 64,000 routes and 1,000 groups

Feature	Specification
QoS	Flexible number of queues per interface: • Up to 64,000 queues • Three levels of hierarchy • Two Low Latency Queuing (LLQ) queues per policy, with up to 1,000 policies 8-kbps policing and queuing granularity <100-microsecond latency for high-priority applications
Real-time traffic	2,000 Compressed Real-Time Transport Protocol (CRTP) sessions
Security	IPsec*: 10,000 tunnels (Hardware is capable of 10,000 tunnels. Currently supported: 4,000) FW/NAT: 250,000 sessions and 10,000 sessions per sec setup rate
L3VPN	1,000 Virtual Route Forwarding (VRF) instances
Generic routing encapsulation (GRE)	1,000 tunnels
Cisco Unified Border Element (SP Edition) (formerly called Session Border Controller or SBC)	4,000 sessions (each session represents a complete voice call with 14 Session Initiation Protocol messages per call; that is, two call legs on the SBC consisting of two media legs for a bidirectional media flow and seven Session Initiation Protocol messages per call leg)

*This product includes software developed by Cavium Networks.

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

Table 4. Cisco ASR 1000 Series 10-Gbps 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 later than + FW/NAT Shared by all Cisco ASR 1000 SPA Interface Processor (ASR1000-SIP10) cards
4 Gbps	For the combination of commonly used features later than + 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 and 500,000 IPv6 routes Multicast: 64,000 routes and 1,000 groups
QoS	Flexible number of queues per interface: • Up to 128,000 queues • Three levels of hierarchy • Two LLQ queues per policy, with up to 1,000 policies 8-kbps policing and queuing granularity <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) FW/NAT: 500,000 sessions and 20,000 sessions per sec setup rate
L3VPN	1,000 VRF instances
GRE	2,000 tunnels
Cisco Unified Border Element (SP Edition) (formerly called Session Border Controller or SBC)	9,000 sessions (each session represents a complete voice call with 14 Session Initiation Protocol 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)

*This product includes software developed by Cavium Networks.

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 later than + FW/NAT Shared by all Cisco ASR 1000 SPA Interface Processor (ASR1000-SIP10) cards
8 Gbps	For the combination of commonly used features later than + IPsec* encryption
Scaling	
Access control	16,000 unique ACLs and 50,000 ACEs per system
Broadband	32,000 sessions and 16,000 L2TP tunnels
IP	4,000,000 IPv4 and 4,000,000 IPv6 routes Multicast: 128,000 routes and 1,000 groups
QoS	Flexible number of queues per interface: • Up to 128,000 queues • Three levels of hierarchy • Two LLQ queues per policy, with up to 1,000 policies 8-kbps policing and queuing granularity; <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) FW/NAT: 1,000,000 sessions and 40,000 sessions per sec setup rate
L3VPN	4,000 VRF instances
GRE	4,000 tunnels
Cisco Unified Border Element (SP Edition) (formerly called Session Border Controller or SBC)	64,000 sessions (each session represents a complete voice call with 14 Session Initiation Protocol 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)

*This product includes software developed by Cavium Networks.

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 later than + FW/NAT Shared by all Cisco ASR 1000 SPA Interface Processor (ASR1000-SIP10 or ASR1000-SIP40) cards
11 Gbps	For the combination of commonly used features later than + IPsec* encryption
Scaling	
Access control	16,000 unique ACLs and 50,000 ACEs per system
Broadband	32,000 sessions and 16,000 L2TP tunnels
IP	4,000,000 IPv4 and 4,000,000 IPv6 routes Multicast: 128,000 routes and 1,000 groups

Feature	Specification
QoS	Flexible number of queues per interface: • Up to 128,000 queues • Three levels of hierarchy • Two LLQ queues per policy, with up to 1,000 policies 8-kbps policing and queuing granularity <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) FW/NAT: 1,000,000 sessions and 40,000 sessions per sec setup rate
L3VPN	8,000 VRF instances
GRE	4,000 tunnels
Cisco Unified Border Element (SP Edition) (formerly called Session Border Controller or SBC)	64,000 sessions (each session represents a complete voice call with 14 Session Initiation Protocol 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)

*This product includes software developed by Cavium Networks.

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

Table 7 and Table 8 lists specifications of the integrated ESP Modules in the Cisco ASR 1001 and Cisco ASR 1002-F chassis respectively. Table 9 lists the specifications of the Cisco ASR 1000 Series 5-, 10-, 10-N-, 20- and 40-Gbps ESP modules.

Table 7. Specifications of the integrated ESP Module in the Cisco ASR 1001 chassis

Feature	Specification				
Product compatibility	ESP module is integrated in Cisco ASR 1001 chassis.				
Software compatibility	Cisco IOS XE Software Release 3.2.S or later (minimum SW release for the integrated ESP module in the ASR1001 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 ASR1001 chassis.				
Memory	For ASR 1000 ESP integrated in the ASR1001 chassis: 1-GB				
Reliability and availability	Software Redundancy support: YES. Hardware Redundancy support: NO Support for online insertion and removal (OIR) Support for Nonstop Forwarding (NSF) and Stateful Switchover (SSO)				
MIBs	RFC 2737 compliant				
Network management	Network management through Cisco ASR 1000 Series Route Processor: • Telnet (command-line interface [CLI]) • Console port (through the CLI) • Simple Network Management Protocol (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

Feature	Specification				
		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 ASR1001 chassis.				
Power	Not applicable: The ESP module is integrated in the ASR1001 chassis.				
Approvals and compliance	Same as for Cisco ASR1001 chassis since the ESP module is integrated in the chassis				
Environmental	Same as for Cisco ASR1001 chassis since the ESP module is integrated in the chassis.				

Table 8. Specifications of integrated ESP Module in the Cisco ASR1002-F chassis

Feature	Specification				
Product compatibility	For ASR1000-ESP2.5: Cisco ASR 1002-F chassis only (integrated in the chassis)				
Software compatibility	Cisco IOS XE Software Release 2.4 or later (minimum SW release for the integrated ESP2.5 in the ASR1002-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 ASR1002-F chassis.				
Memory	For ASR ESP integrated in the ASR1002-F chassis: TBC				
Reliability and availability	Software Redundancy support: YES. Harware Redundancy support: NO Support for online insertion and removal (OIR) Support for Nonstop Forwarding (NSF) and Stateful Switchover (SSO)				
MIBs	RFC 2737 compliant				
Network management	Network management through Cisco ASR 1000 Series Route Processor: • Telnet (command-line interface [CLI]) • Console port (through the CLI) • Simple Network Management Protocol (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 ASR1002-F chassis.				
Power	Not applicable: The ESP module is integrated in the ASR1002-F chassis.				
Approvals and compliance	Same as for Cisco ASR1002-F chassis since the ESP module is integrated in the chassis.				
Environmental	Same as for Cisco ASR1002-F chassis since the ESP module is integrated in the chassis.				

Table 9. Specifications of Cisco ASR 1000 Series 5- 10-, 10-N-, 20-, and 40-Gbps ESP Modules

Feature	Specification
Product compatibility	For ASR1000-ESP5: Cisco ASR 1002 Router chassis only For ASR1000-ESP10: Cisco ASR 1002, ASR 1004, and ASR 1006 Router chassis For ASR1000-ESP10-N: Cisco ASR 1002, ASR 1004, and ASR 1006 Router chassis For ASR1000-ESP20: Cisco ASR 1004 and ASR 1006 Router chassis For ASR1000-ESP40: Cisco ASR1006 and ASR1013 Router chassis
Software compatibility	Cisco IOS XE Software Release 2.1 (minimum SW release for ESP5 and ESP10) Cisco IOS XE Software Release 2.2 or later (minimum SW release for ESP20) Cisco IOS XE Software Release 3.1.0S or later (minimum SW release for ESP40)

<table>
<tr><th>Feature</th><th colspan="5">Specification</th></tr>
<tr><td>Protocols</td><td colspan="5">Refer to Cisco IOS XE Software Release 2.1, 2.2, 3.1.0S, and 3.1.0S (or later) protocol support</td></tr>
<tr><td>Connectivity</td><td colspan="5">Refer to Cisco ASR 1000 Series SIP data sheet for SPA support</td></tr>
<tr><td>Memory</td><td colspan="5">For ASR1000-ESP5: 256-Mbps Cisco QuantumFlow Processor, 1-Gbps DRAM, 10-Mbps TCAM, and 64-Mbps packet buffer memory
For ASR1000-ESP10: 512-Mbps Cisco QuantumFlow Processor, 2-Gbps DRAM, 10-Mbps TCAM, and 128-Mbps packet buffer memory
For ASR1000-ESP10-N: 512-Mbps Cisco QuantumFlow Processor, 2-Gbps DRAM, 10-Mbps TCAM, and 128-Mbps packet buffer memory
For ASR1000-ESP20: 1-Gbps Cisco QuantumFlow Processor, 4-Gbps DRAM, 40-Mbps TCAM, and 256-Mbps packet buffer memory
For ASR1000-ESP40: 1-Gbps Cisco QuantumFlow Processor, 8-Gbps DRAM, 40-Mbps TCAM, and 256-Mbps packet buffer memory</td></tr>
<tr><td>Reliability and availability</td><td colspan="5">For ASR1000-ESP10, ASR1000-ESP10-N, ASR1000-ESP20, and ASR1000-ESP40: High availability 1 + 1 redundancy in dual ESP configuration in combination with Cisco ASR 1006 or ASR 1013 Router chassis
Support for online insertion and removal (OIR)
Support for Nonstop Forwarding (NSF) and Stateful Switchover (SSO)
Support for In Service Software Upgrade (ISSU) with ASR1006 or ASR1013 in combination with dual Route Processors and dual Embedded Services Processors</td></tr>
<tr><td>MIBs</td><td colspan="5">RFC 2737 compliant</td></tr>
<tr><td>Network management</td><td colspan="5">Network management through Cisco ASR 1000 Series Route Processor:
Telnet (command-line interface [CLI])
Console port (through the CLI)
Simple Network Management Protocol (SNMP) (RFC 2665)</td></tr>
<tr><td rowspan="8">Status LED descriptions</td><td>No.</td><td>LED Label</td><td>LED</td><td>Color-State</td><td>Behavior Description</td></tr>
<tr><td></td><td rowspan="2">PWR</td><td rowspan="2">Power</td><td>Solid green</td><td>All power rails are within specifications.</td></tr>
<tr><td></td><td>Off</td><td>Off, the route is in standby mode.</td></tr>
<tr><td></td><td>STAT</td><td>System status</td><td>Solid green</td><td>Cisco IOS Software has successfully booted.</td></tr>
<tr><td></td><td></td><td></td><td>Yellow</td><td>BOOT ROMmon has successfully loaded.</td></tr>
<tr><td></td><td></td><td></td><td>Red</td><td>System failure. On Power up, turned off by software.</td></tr>
<tr><td></td><td>ACTV</td><td>Activity</td><td>Green</td><td>Lit when this is the active route processor</td></tr>
<tr><td></td><td>STBY</td><td>Standby</td><td>Yellow</td><td>Lit when this is the standby route processor</td></tr>
<tr><td>Physical dimensions (H x W x D)</td><td colspan="5">0.92 x 16.7 x 14.19 in. (0.02 x 0.428 x 0.36m)</td></tr>
<tr><td>Power</td><td colspan="5">For ASR1000-ESP5, ASR1000-ESP10, and ASR1000-ESP10-N: 188W maximum (typical: 140W)
For ASR1000-ESP20: 230W maximum (typical: 150W)
For ASR1000-ESP40: 267W maximum (typical: 227W)</td></tr>
</table>

Feature	Specification
Approvals and compliance	Safety • UL60950 and CAN/CSA-C22.2 No. 60950. Information technology equipment • AS/NZS 60950 • IEC/EN 60950 Information technology equipment • 73/23/EEC Electromagnetic Emissions Certification • AS/NZ 3548: 1995 (including AMD I + II) Class A • EN55022: 1998 Class A • CISPR 22: 1997 • EN55022: 1994 (including AMD I + II) • 47 CFR Part 15: 2000 (FCC) Class A • VCCI V-3/01.4 Class A • CNS-13438: 1997 Class A • GR1089: 1997 (including Rev. 1: 1999) Immunity • EN300386: 2000-TNE EMC requirements; product family standard; high priority of service; central office and noncentral office locations • EN50082-1: 1992/1997 • EN50082-2: 1995-Generic Immunity Standard, Heavy Industrial • CISPR24: 1997 • EN55024: 1998-Generic ITE immunity standard • EN61000-4-2: 1995 + AMD I + II ESD, Level 4/8 kV contact, 15 kV air • IEC-1000-4-3: 1995 + AMD 1-Radiated Immunity, 10 V/m • IEC-1000-4-4: 1995-Electrical Fast Transients, Level 4/4 kV/B • IEC-1000-4-5: 1995 + AMD 1-DC Surge-Class 3; AC Surge-Class 4 • EN61000-4-6: 1996 + AMD 1-RF conducted immunity, 10V rms • EN61000-4-11: 1995-Voltage Dips and Sags • ETS300 132-2: 1996 + corrigendum, December 1996 • GR1089:1997 (including Rev1: 1999) Network Equipment Building Standards • The module meets the following Networking Equipment Building Standards (NEBS): • GR-1089-CORE • GR-63-CORE • European Telecommunication Standards Institute (ETSI) • ETSI 300 386-1 - Levels for equipment with a "high priority of service" that is installed in "locations other than telecommunication centers" • ETSI 300 386-2:1997 - Levels for equipment with a "high priority of service" that is installed in "locations other than telecommunication centers" • ETSI 300 132-2: December 1994 - Power supply interfaces at the input to telecommunications equipment Sections 4.8 and 4.9
Environmental	Storage temperature: -38 to 150°F (-40 to 70°C) Operating temperature, nominal: 41 to 104°F (5 to 40°C) Operating temperature, short-term: 23 to 131°F (-5 to 55°C) Storage relative humidity (RH): 5 to 95% RH Operating humidity, nominal: 5 to 85% RH Operating humidity, short-term: 5 to 90% RH Operating altitude: -60 to 4000m (up to 2000m conforms to IEC/EN/UL/CSA 60950 requirements)

System Requirements

Table 10 gives system requirements.

Table 10. System Requirements

System	Requirement
Hardware	ESP at 2.5 Gbps and 5-Gbps integrated in Cisco ASR1001 chassis. Default performance is 2.5-Gbps and can be upgraded to 5-Gbps with a license through software activation ESP at 2.5-Gbps integrated in Cisco ASR1002-F chassis For ASR1000-ESP5: Cisco ASR 1002 Router chassis only For ASR1000-ESP10 and ASR1000-ESP10-N: Cisco ASR 1002 Router chassis or Cisco ASR 1004 Router chassis with one instance of Cisco ASR 1000 Series Route Processor and one instance of Cisco ASR 1000 Series SIP or 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 SIP For ASR1000-ESP20: Cisco ASR 1004 Router chassis with one instance of Cisco ASR 1000 Series Route Processor and one instance of Cisco ASR 1000 Series SIP or 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 SIP For ASR1000-ESP40: 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 SIP or 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 SIP
Software	Cisco IOS XE Software Release 2.1 (for ESP5 and ESP10 only) or later (ESP10-N and ESP20: Release 2.2 or later) Cisco IOS XE Software Release 2.4 (for ESP2.5 integrated in the ASR1002-F chassis) Cisco IOS XE Software Release 3.1.0S (for ESP40) or later Cisco IOS XE Software Release 3.2S (for integrated ESP in ASR1001 chassis) or later

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 11. For further information, please refer to the Cisco ASR 1000 Series Aggregation Services Routers Orderability product bulletin.

Please refer to Tables 12 through 17 for compatible hardware and Table 18 for compatible software.

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

Table 11. 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

Table 12. Cisco ASR 1000 Series Integrated ESP in 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

Table 13. Cisco ASR 1000 Series Integrated ESP in ASR1002-F Chassis Compatible Hardware

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

Table 14. Cisco ASR 1000 Series 5-Gbps ESP (ASR1000-ESP5) Compatible Hardware

Product Name	Part Number
Cisco ASR 1002 Router Chassis	ASR1002

Table 15. Cisco ASR 1000 Series 10-Gbps (ASR1000-ESP10) and 10-N-Gbps (ASR1000-ESP10-N) 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 ASR1000-ESP10 modules.

Table 16. Cisco ASR 1000 Series 20-Gbps 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 ASR1000-ESP20 modules.

Table 17. Cisco ASR 1000 Series 40-Gbps ESP (ASR1000-ESP40) Compatible Hardware

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

*Supports 1+1 redundancy when configured with two ASR1000-ESP40 modules.

Table 18. 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

Product Name	Part Number
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 IOS XE 2.4 and therefore requires as a minimum the IOS XE 2.4 software. Cisco ASR1001 chassis with an integrated ESP Module is supported as of IOS XE 3.2S. For info on the software and feature licenses supported on Cisco ASR1001, please refer to Product Bulletin “Cisco ASR 1000 Software Activation”.

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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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