

Cisco ASR 9000 Series Integrated Service Module

Product Overview

Cisco® ASR 9000 Series Integrated Service Module (ISM) is a universal service foundation for Cisco ASR 9000 Aggregation Services Routers. The module provides a highly scalable modular services delivery platform for delivering multiple types of services. Currently the Integrated Services Module (Figure 1) supports the following services:

- Carrier Grade Network Address Translation (NAT): CGN
- Dual-Stack Lite
- Stateful NAT64
- Mapping of Address and Port Translation (MAP-T)

The service hosted on an ISM may be changed at any time by changing the service image loaded on the ISM. Multiple services can coexist on multiple ISMs in the same Cisco ASR 9000 system.

Figure 1. Cisco ASR 9000 Series Integrated Service Module



Major Features and Benefits

The Cisco ASR 9000 Series ISM is designed to deliver flexible and highly scalable service integration that allows operational efficiency, service flexibility, and faster time to market. The module offers the architectural advantages of integration with the routing system.

- Modular design: Cisco ASR 9000 Series ISMs can be added to the network as required. Additional modular and pluggable flash memory extensions allow easy replacement and upgrades to storage capacity for video applications.
- Power and space efficiency: Router integration provides significant power and space requirement reductions by fitting the video streamers into the line card factor.
- Carrier-grade standards compliance: The module is compliant to carrier-grade standards and offers a hardened design that fits rigid Service Providers Central Office deployment requirements.

A Cisco ASR 9000 system populated with ISMs becomes a platform upon which new services and applications can be layered over time and deployed much more quickly than was possible in the past. Applications hosted on the ISM are separated from the Cisco IOS® XR plane, allowing for high flexibility in service deployment, service upgrade, and service resiliency. Multiple services can be hosted on the same hardware platform, which reduces the cycle time in certification for deploying new services on the Cisco ASR 9000 Series Routers.

Features and benefits of the Cisco ASR 9000 Series ISM are listed in Table 1.

Table 1. Features and Benefits of Cisco ASR 9000 Series Integrated Service Module

Feature	Benefit
High-performance processing	Twelve CPU cores promote high performance for computationally intensive tasks such as sustained video streaming operations or per-stream targeted advertisement insertion.
Integrated application forwarding plane architecture	Provides integration with router forwarding infrastructure and no external ports.
Service flexibility	ISM module can be repurposed by loading a different application.
High power and space efficiency	Single-slot form factor; efficient power load sharing and redundancy benefit from router integration.
48-GB hard disk drive (HDD)	This capacity allows storing of core dumps and helps reduce the system mean time to repair (MTTR).
64-GB solid state drive (SSD)	The 56-GB usable storage capacity of the SSD allows storing of the application operating system, application image, and application databases.
Front-panel LEDs	LEDs provide visual indication of ISM status (active or standby) and power management.
Network Equipment Building Standards (NEBS) compliance	Carrier-grade resiliency and temperature hardening meet rigid Service Provider Central Office deployment requirements.

Table 2 lists the hardware that ships with the Cisco ASR 9000 Series ISM.

Table 2. Cisco ASR 9000 Series ISM Hardware Available

Product Number	Product Description
Cisco ASR 9000 Series Integrated Service Module	
A9K-ISM-100	Integrated Service Module includes the following: • Switch fabric interfaces • CPU: ◦ Two high-performance multicore processors for application processing ◦ One multicore processor for Cisco IOS XR Software • Memory internal: 48-GB DRAM memory • Management: in-band hardware management through Cisco IOS XR Software • LED on front panel for status display

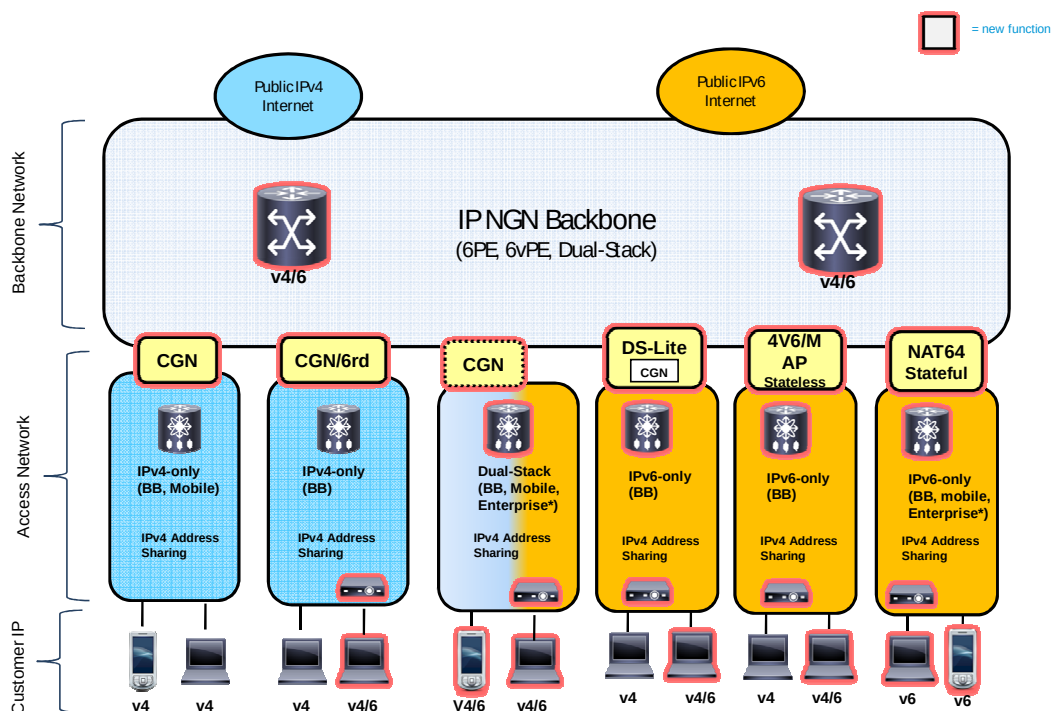
Software

The Cisco ASR 9000 Series ISM is powered by Cisco IOS XR Software: an innovative self-healing, distributed operating system designed for always-on operation while scaling system capacity up into the Tbps range. Cisco IOS XR Software is responsible for the forwarding and environmental functions of the module. Services software available for the Cisco ISM includes a suite of Carrier Grade NAT and CGv6 transformational technologies.

Carrier Grade IPv4 to IPv6 Transition Technologies

Cisco provides a suite of options to address the challenges posed by the IPv4 address space depletion and help customers to transition to IPv6. Figure 2 illustrates various possible scenarios.

Figure 2. Composite IPv6 NGN Architectures



For more information on the transformational technologies that help our customers to address the challenges posed by the shift from IPv4 to IPv6, please refer to the white paper at [Cisco Carrier-Grade IPv6 \(CGv6\) Solution Delivering on the future of the Internet](#). These CGv6 transitional technologies can be classified as stateless or stateful, depending on whether the translation or tunneling is arrived at algorithmically or requires the maintenance of the state information on the Border Relay gateway.

Stateful applications supported on Cisco ASR 9000 ISM include the following.

- Cisco CGN application software provides highly scalable address translations from private IPv4 addresses to public IPv4 addresses (NAT44). Service-provider-class NAT44 to address IPv4 depletion is based on existing IETF NAT behaviors described in RFCs 4787, 5382, and 5508, and allows customers to preserve their present mode of operation (PMO). CGN on ISM is available from Cisco IOS XR Software Release 4.2.0.
- Dual-Stack Lite (DS-Lite) Border Gateway is a combination of tunneling and translation techniques that supports IPv4 traffic over IPv6 infrastructure. DS-Lite terminates IPv6 tunnels carrying IPv4 traffic and translates the IPv4 local addressing into globally routable IPv4 using NAT44. DS-Lite on ISM is available from Cisco IOS XR Software Release 4.2.1.
- Stateful NAT64 application software addresses translation of an IP address from one address family into another IP address from another address family (for instance, from one IPv6 address into an IPv4 address where the initiator is on the IPv6 side). Stateful NAT64 is available from Cisco IOS XR Software Release 4.3.0.

Stateless applications supported on Cisco ASR 9000 ISM today include the following.

- MAP-T employs a combination of translation technologies. Earlier referred to as Dual I/VI (dIVI) or 4464, MAP-T allows customers to offer IPv4 services to IPv6-enabled customer sites. With the access network on IPv6, customers see IPv6 and IPv4 services simultaneously. MAP-T keeps the stateful NAT44 on customer premises equipment (CPE), to handle IPv4 address exhaustion, in addition to stateless NAT64 on CPE and the Border Router. The new Ethernet line cards on the Cisco ASR 9000 Series implement the MAP-T translation inline, while the ISM is responsible for configuration and handling of exception packets. MAP-T border router support on Cisco ASR 9000 is available from Cisco IOS XR Software Release 4.3.0.

Cisco ASR 9000 Series ISM is designed to implement the IPv6 transition technologies in a highly scalable manner. Stateful CGv6 transition technologies on ISM can scale to tens of millions of IP address translations with tens of gigabits of performance to address IPv4 depletion and support the IPv6 transition. Several ISM modules can be populated within a chassis for a high-performance solution that is deployable at places in the network where a distributed CGN solution is desirable. The Cisco Integrated Services Module supports a highly available architecture with line-rate accounting and logging of translation information. The Cisco IOS XR Software on the platform offers a flexible means to divert select packets through the ISM, while allowing global IPv4 and IPv6 packets to traverse the forwarding infrastructure as usual.

The Cisco Integrated Services Module with CGN Application offers service providers a near-term solution to address IPv4 exhaustion and preserve their present mode of operation. At the same time, it offers low-risk, cost-effective methods to activate IPv6 tunneling and translation functions. Table 3 lists the CGv6 features and benefits.

Table 3. Cisco ASR 9000 Series CGv6 Software Features and Benefits

Feature	Benefit
Application-level gateway (ALG) support	• CGN: FTP and RTSP • DS-Lite: FTP
Standards supported	• CGN: RFC4787, RFC5382, and RFC5508 • DS-Lite: RFC5382, RFC5508, RFC2473, and RFC4213
Logging	Translation logging through NetFlow v9 and Syslog
Performance	• Maximum 20 million simultaneous sessions for CGN and DS-Lite, and 15 million simultaneous sessions for NAT64. • Maximum 1 million sessions set up per second
Software compatibility	• Cisco IOS XR Software Release 4.2.0 and later for CGN • Cisco IOS XR Software Release 4.2.1 and later for DS-Lite • Cisco IOS XR Software Release 4.3.0 and later for stateful NAT64. • Cisco IOS XR Software Release 4.3.0 and later for MAP-T

Product Specifications

Table 4 provides details about the two chassis variants of the Cisco ASR 9000 Series Integrated Service Module.

Table 4. Product Specifications

Specification Category	Specification
Redundancy	- No single point of failure - Fabric redundancy - Power supply redundancy - ISM redundancy (through CDSM)
Physical specifications	Cisco ASR 9000 Series ISM (A9K-ISM-100) occupies one slot; can be inserted in any slot within the chassis: - Height: 1.65 in. (4.19 cm.) - Width: 15.86 in. (40.28 cm.) - Depth: 23.91 in. (60.73 cm.) - Weight: 18.35 lb Pluggable SSD flash storage service acceleration module (A9K-SAM-2TB): - Height: 1.4 in. (3.55 cm.) - Width: 6.41 in. (16.28 cm.) - Depth: 7.35 in. (18.66 cm.) - Weight: 1.33 lb
Power input	- Worldwide ranging AC: 200–240V; 50–60 Hz; 16A nominal - Worldwide ranging DC: –48V to –60V; –54V; 50A nominal
Environmental conditions	- Operating temperature: 32 to 104°F (0 to 40°C) - Storage temperature: –40 to 167°F (–40 to 75°C) - Relative humidity: 10 to 90%, noncondensing - Regulatory compliance
Power consumption	- Typical: 330W - Maximum: 450W
Environmental Specifications	
Operating temperature (nominal)	41 to 104°F (5 to 40°C)
Operating temperature (short-term)	23 to 131°F (–5 to 55°C) Short-term refers to a period of not more than 96 consecutive hours and a total of not more than 15 days in 1 year (total of 360 hours in any given year, but no more than 15 occurrences during that one-year period).
Operating humidity (nominal) (relative humidity)	10 to 85%
Operating humidity (short-term)	5 to 90% Note: Not to exceed 0.024 kg water or dry air
Storage temperature	–40 to 158°F (–40 to 70°C)
Storage (relative humidity)	5 to 95% Note: Not to exceed 0.024 kg water or dry air.
Operating altitude	–60 to 4000m (up to 2000m conforms to IEC/EN/UL/CSA 60950 requirements)
Compliance	
NEBS	Cisco ASR 9000 Series Integrated Service Module is designed to meet: - SR-3580: NEBS Criteria Levels (Level 3) - GR-1089-CORE: NEBS EMC and Safety - GR-63-CORE: NEBS Physical Protection

Specification Category	Specification
ETSI standards	Cisco ASR 9000 series Integrated Service Module is designed to meet: • EN300 386: Telecommunications Network Equipment (EMC) • ETSI 300 019 Storage Class 1.1 • ETSI 300 019 Transportation Class 2.3 • ETSI 300 019 Stationary Use Class 3.1 • EN55022: Information Technology Equipment (Emissions) • EN55024: Information Technology Equipment (Immunity) • EN50082-1/EN-61000-6-1: Generic Immunity Standard
EMC standards	Cisco ASR 9000 series Integrated Service Module is designed to meet: • FCC Class A • ICES 003 Class A • AS/NZS 3548 Class A • CISPR 22 (EN55022) Class A • VCCI Class A • BSMI Class A • IEC/EN 61000-3-2: Power Line Harmonics • IEC/EN 61000-3-3: Voltage Fluctuations and Flicker
Immunity	Cisco ASR 9000 series Integrated Service Module is designed to meet: • IEC/EN-61000-4-2: Electrostatic Discharge Immunity (8kV Contact, 15kV Air) • IEC/EN-61000-4-3: Radiated Immunity (10V/m) • IEC/EN-61000-4-4: Electrical Fast Transient Immunity (2kV Power, 1kV Signal) • IEC/EN-61000-4-5: Surge AC Port (4kV CM, 2kV DM) • IEC/EN-61000-4-5: Signal Ports (1kV) • IEC/EN-61000-4-5: Surge DC Port (1kV) • IEC/EN-61000-4-6: Immunity to Conducted Disturbances (10Vrms) • IEC/EN-61000-4-8: Power Frequency Magnetic Field Immunity (30A/m) • IEC/EN-61000-4-11: Voltage DIPS, Short Interruptions, and Voltage Variations
Safety	Cisco ASR 9000 series Integrated Service Module is designed to meet: • UL/CSA/IEC/EN 60950-1 • IEC/EN 60825 Laser Safety • ACA TS001 • AS/NZS 60950 • FDA: Code of Federal Regulations Laser Safety

Cisco Services for Cisco ASR 9000 Series

Through a lifecycle services approach, Cisco delivers comprehensive support to service providers to help them successfully deploy, operate, and optimize their IP Next-Generation Networks (IP NGNs). Cisco Services for the Cisco ASR 9000 Aggregation Services Routers provide the services and proven methodologies that help assure service deployment with substantial return on investment, operational excellence, optimal performance, and high availability. These services are delivered using leading practices, tools, processes, and lab environments developed specifically for Cisco ASR 9000 Series deployments and post-implementation support. The Cisco Services team addresses your specific requirements, mitigates risk to existing revenue-generating services, and helps accelerate time to market for new network services.

For more information about Cisco Services, contact your local Cisco account representative or visit www.cisco.com/go/spservices.

Ordering Information

Table 6 provides ordering information for the Cisco ASR 9000 Series Integrated Service Module.

Table 5. Ordering Information

Product Name	Supported Software Release	Part Number
Hardware		
Cisco ASR 9000 Series ISM	Cisco IOS XR Software Release 4.1.0 or later	A9K-ISM-100
Cisco ASR 9000 Series ISM, spare	Cisco IOS XR Software Release 4.1.0 or later	A9K-ISM-100=
ISM Software		
Cisco ASR 9000 CGN License (1 per 5 million translations)	Cisco IOS XR Software Release 4.2.0 or later	A9K-CGN-LIC-5M
Cisco ASR 9000 DS-Lite License (1 per 5 million translations)	Cisco IOS XR Software Release 4.2.1 or later	A9K-DSLT-LIC-5M
Cisco ASR 9000 Stateful NAT64 License (1 per 5 million translations)	Cisco IOS XR Software Release 4.3.0 or later	A9K-NAT64-LIC-5M
Ethernet Line Card Inline CGv6 Licenses		
License for Inline CGv6 Transition features on the MOD80 Line Cards	Cisco IOS XR Software Release 4.3.0 or later	A9K-M80-V6-INLN
License for Inline CGv6 Transition features on the MOD160 Line Cards	Cisco IOS XR Software Release 4.3.0 or later	A9K-M160-V6-INLN
License for Inline CGv6 Transition features on the 24X10G Line Card	Cisco IOS XR Software Release 4.3.0 or later	A9K-24XT-V6-INLN
License for Inline CGv6 Transition features on the 1X100G Line Card	Cisco IOS XR Software Release 4.3.0 or later	A9K-1X100-V6-INLN
License for Inline CGv6 Transition features on the 2X100G Line Card	Cisco IOS XR Software Release 4.3.0 or later	A9K-2X100-V6-INLN
License for Inline CGv6 Transition features on the 36X10G Line Card	Cisco IOS XR Software Release 4.3.0 or later	A9K-36XT-V6-INLN

To place an order, visit the [Cisco Ordering Home Page](#) and refer to Table 6.



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