White Paper

Cisco ASR 1000 Series Aggregation Services Routers

Executive Summary

The Cisco® ASR 1000 Series Aggregation Services Routers are the next-generation, modular, highly services-integrated Cisco routing platforms designed with the flexibility to support a wide range of 4- to 130-Mpps packet-forwarding capabilities, 2.5- to 200-Gbps system bandwidth performance, and scaling. The overall system architecture is common across the chassis. With the Cisco ASR 1000 Series, Cisco has created an entirely new price-for-performance class with an innovative set of capabilities to respond to changes that are converging within service provider and enterprise networks: video, Web 2.0, collaborative applications, and emerging requirements, all of which require a different type of edge device.

This paper outlines the benefits of the Cisco ASR 1000 Series. For further product details, please visit http://www.cisco.com/en/US/products/ps9343/index.html.

System Innovations

Cisco ASR 1000 Series Routers bring many innovations to the routing industry; some of the most notable ones follow:

- Extremely modular, flexible, and integrated design for meeting changing requirements in today's networks.
- First revolutionary Cisco QuantumFlow Processor (QFP).
- Cisco QuantumFlow Processor-based platform that facilitates various services at up to 200 Gbps; it is designed for 360-Gbps throughput in the future on the Cisco ASR 1013.
- True carrier-class system from the beginning, with the In-Service Software Upgrade (ISSU) that offers nonstop router operation.
- Complete logical and physical separation of system routing, forwarding, and I/O planes, resulting in a highly comprehensive system that is flexible to meet always-increasing performance needs.
- Software modularity to minimize the effects of software upgrades in the system and lower operating expenses.
- Highly sophisticated system software and hardware design to boost application availability, even during system oversubscription.
- Lights-out remote-management facility: The Cisco ASR 1000 Series Route Processor remains accessible through a console Ethernet management port, even during Cisco IOS® Software failure.
- Investment protection: These routers reuse the investment made in network I/O by using Cisco shared port adapters (SPAs).

Cisco ASR 1000 Series Router Overview

The Cisco ASR 1000 Series Router is intended to address the performance gap between Cisco 7200 and 7300 Routers and Cisco 7600 and Cisco ASR 9000 Series Routers. The Cisco ASR 1000 Series is fully modular, from both hardware and software perspectives. Cisco ASR 1000 Series Routers have all the elements of a carrier-class routing product, serving both enterprise and service provider networks. For enterprise customers, Cisco ASR 1000 Series Routers are intended as the midsize aggregation and gateway product, typically residing in a regional WAN or secure WAN edge or large branch office and providing throughput in the 2.5- to 200-Gbps range with various services turned on. For service provider customers, Cisco ASR 1000 Series Routers are intended to provide midrange service provider edge service functions, Data Center Interconnect (DCI), and Broadband Remote Access Server aggregation.

The Cisco ASR 1000 Series includes various packaging options differentiated by the number of I/O slots, capacity, redundancy, and power. A common hardware and software architecture and common components are used across these new router platforms to support the various modular and nonmodular chassis configurations (ranging from 1 to 13 rack units [13RUs]). All Cisco ASR 1000 Routers have dual power supplies. The following chassis options are available:

- Cisco ASR 1001 Router (1RU chassis with fixed Cisco ASR 1000 Series Embedded Services Processor [ESP], fixed Cisco ASR 1000 Series Route Processor [RP], and fixed Cisco ASR 1000 Series SPA Interface Processor [SIP] with 4 built-in Gigabit Ethernet ports and an Integrated Daughter Card [IDC] offering different I/O options for five of the six Cisco ASR 1001 chassis models)
- Cisco ASR 1002 Router (2RU chassis with modular ESP, fixed route processor, and fixed SIP with 4 built-in Gigabit Ethernet ports)
- Cisco ASR 1002-X Router (2RU chassis with ESP, route processor, and SIP fully integrated with 6 built-in Gigabit Ethernet ports)
- Cisco ASR 1004 Router (4RU chassis with modular ESP, modular route processor, and modular SIPs for SPA connectivity)
- Cisco ASR 1006 Router (6RU chassis with modular and redundant ESPs, modular and redundant route processors, and modular SIPs for SPA connectivity)
- Cisco ASR 1013 Router (13RU chassis with modular and redundant ESPs, modular and redundant route processors, and modular SIPs for SPA connectivity)

The performance and scaling of Cisco ASR 1000 Series Routers for a forwarding plane-bounded feature are dictated by the capability of the central forwarding engine of the router in the form of an ESP module. Different ESP modules are available for all the chassis to offer you cost, performance, and scaling choices.

The following eight types of ESPs are available, providing 2.5, 5, 10, 20, 40, 100, and 200 Gbps of system bandwidths, respectively:

- 2.5-Gbps ESP (ESP2.5; this ESP has no part number because it is integrated in the Cisco ASR 1001 chassis; an upgrade to 5 Gbps is available with the purchase of the performance software license upgrade [FLSASR1001-5G])
- 5-Gbps ESP (ESP5; part number ASR1000-ESP5 for Cisco ASR 1002, and for Cisco ASR 1001 it is available through a software license upgrade [FLSASR1001-5G])

- 10-Gbps ESP (ESP10; part number ASR1000-ESP10), supported on Cisco ASR 1002, ASR 1004, and ASR 1006 Routers
- 10-Gbps ESP without crypto chip (ESP10-N; part number ASR1000-ESP10-N), supported on Cisco ASR 1002, ASR 1004, and ASR 1006; this ESP module does not have the built-in crypto chip on the module itself
- 20-Gbps ESP (ESP20; part number ASR1000-ESP20), supported on Cisco ASR 1004 and ASR 1006
- 40-Gbps ESP (ESP40; part number ASR1000-ESP40), supported on Cisco ASR 1004, ASR 1006, and ASR 1013
- 100-Gbps ESP (ESP100; part number ASR1000-ESP100), supported on Cisco ASR 1006 and ASR 1013
- 200-Gbps ESP (ESP200; part number ASR1000-ESP200), supported on Cisco ASR 1013

The Cisco ASR 1002-X Router has fully integrated ESP, providing system bandwidths of 5 (default), 10, 20, and 36 Gbps, all through software licenses without the need to change hardware.

The Cisco ASR 1000 Series delivers multiple services embedded in the Cisco QuantumFlow Processor at wire speeds from 2.5 to 200 Gbps. The services supported on the Cisco QFP include security services (that is, encryption and firewall), quality of service (QoS), Application Visibility and Control (AVC), Cisco Network Address Translation (NAT and NAT64), Cisco IOS Flexible Packet Matching (FPM), broadband aggregation, and Cisco Unified Border Element (SP and Enterprise Edition) (formerly called Session Border Controller, or SBC), among others.

With the separation of the control and data planes in the Cisco ASR 1000 Series Router architecture, software redundancy (on the Cisco ASR 1001, ASR 1002, ASR 1002-X, and ASR 1004 Routers) and hardware redundancy (on the Cisco ASR 1006 and ASR 1013 Routers) are provided. Additionally, the modular Cisco IOS XE Software that is introduced with the Cisco ASR 1000 Series facilitates ISSU on the Cisco ASR 1006 and ASR 1013.

Product Overview

The Cisco ASR 1000 Series provides a significant enhanced value compared to prior generations of Cisco midrange routing solutions by providing more than tenfold performance improvement with services running. Additionally, the routers have hardware and software redundancy, as well as an industry-leading high-availability design.

The Cisco ASR 1000 Series consists of six different versions: the Cisco ASR 1001, ASR 1002, ASR1002-X, ASR 1004, ASR 1006, and ASR 1013 Routers. All six models use the innovative and powerful Cisco QuantumFlow Processor, which provides a huge leap in performance and resiliency for network processors.

Note: The end of sale of the Cisco ASR 1002 Fixed Router chassis, which has the route processor, ESP, and SIP integrated, 1 single-height SPA slot, 4 built-in Gigabit Ethernet ports, and offers up to 2.5-Gbps throughput, was announced on August 1, 2011. The last day of support will be on August 1, 2017.

The first router in the Cisco ASR 1000 Family, based on the RU height, is the Cisco ASR 1001 (1RU) Router. Cisco ASR 1001 first customer shipment (FCS) was in November 2010 with the Cisco IOS XE Software Release 3.2.0S. The Cisco ASR 1001 is an ideal solution for high-end enterprise branch offices, for WAN aggregation and secure WAN, route reflector, low-end broadband aggregation (L2TP Network Server [LNS]), or for managed services to support enhanced features such as security, deep packet inspection, and firewall.

The Cisco ASR 1001 has the same instant service delivery capabilities and high-performance features as the rest of the Cisco ASR 1000 Series. This 1RU-form-factor routing platform comes with an integrated route processor (which is close in control-plane scaling to the Cisco ASR 1000 RP2 [ASR1000-RP2] route processor), integrated ESP (that offers a default system bandwidth of 2.5 Gbps and 5 Gbps of forwarding capacity with software-activated upgrade license), and integrated carrier card (SIP).

The Cisco ASR 1001 Router also houses 1 SPA slot that supports single-height SPAs. In addition to the 4 built-in Gigabit Ethernet ports, the Cisco ASR 1001 Router also introduces the concept of IDCs, which are optional additional cards built in the router (not field-upgradable). Six models of the Cisco ASR 1001 Router are currently available:

Supported as of Cisco IOS XE Software Release 3.2.0S:

- Cisco ASR 1001 (ASR1001) without an IDC
- Cisco ASR 1001 with an IDC with 2 OC-3 Packet over SONET/SDH (PoS) ports (ASR1001-2XOC3POS)
- Cisco ASR 1001 with an IDC with 4 T3 ports (ASR1001-4XT3) but no E3 circuitry support

Supported as of Cisco IOS XE Software Release 3.3.0S:

- Cisco ASR 1001 with four 1-Gigabit Ethernet ports (ASR1001-4X1GE)
- Cisco ASR 1001 with 8 Channelized T1/E1 ports (ASR1001-8XCHT1E1)
- Cisco ASR 1001 with a 160-GB hard disk drive (ASR1001-HDD) (160 GB)

The second router in the Cisco ASR 1000 Family is the Cisco ASR 1002 Router. This 2RU-form-factor router comes with an integrated route processor (RP1) and SIP. It houses 3 SPA slots supporting single- and dual-height SPAs. It comes with 1 modular ESP slot, supporting either the 5- or 10-Gbps ESP, and 4 built-in Gigabit Ethernet ports.

The third router in the Cisco ASR 1000 Family is the Cisco ASR 1002-X Router. This router also has a 2RU form factor, and it comes with an integrated route processor whose control-plane scaling performance is close to that of the RP2, integrated ESP that uses the second generation of the Cisco Quantum Flow Processor, and an integrated carrier card (SIP). The Cisco ASR 1002-X Router offers a default system bandwidth of 5 Gbps, upgradable to 10, 20, or 36 Gbps, through software-activated upgrade licenses. It also houses 6 built-in Gigabit Ethernet ports and 3 SPA slots, and provides the same instant service delivery capabilities and high-performance features as the rest of the Cisco ASR 1000 Series.

The fourth router in the Cisco ASR 1000 Family is the Cisco ASR 1004 Router. This 4RU-form-factor router supports up to 8 SPAs and comes with 1 route-processor slot (supporting RP1 or RP2) and 1 ESP slot (supporting ESP10, ESP20, or ESP40). This router provides flexibility for future upgrades, enhancing control- and data-plane scalability. The Cisco ASR 1004 Router provides up to 40-Gbps throughput support, making it a very cost-effective edge solution.

The fifth router in the Cisco ASR 1000 Family is the Cisco ASR 1006 Router. Unlike the Cisco ASR 1001, ASR 1002, and ASR 1004, this 6RU-form-factor router supports a dual hardware architecture with two route processors (two RP1s or two RP2s) and two ESPs (10, 20, 40, or 100 Gbps). The support of dual route processors and dual ESPs is optional. The Cisco ASR 1006 can also run with a single route processor and a single ESP. It supports up to 12 SPAs, and supports hardware redundancy and ISSU.

The sixth router in Cisco ASR 1000 Family is the Cisco ASR 1013 Router. This 13RU-form-factor router has the highest port density solution among the Cisco ASR 1000 Routers. Like the Cisco ASR 1006 Router, it has a centralized, redundant architecture, and supports hardware redundancy and ISSU. The Cisco ASR 1013 provides "super slots" for route processors (RP2) as well as the ESP-40 and ESP-100. The ESP modules on the Cisco ASR 1013 are available in 40, 100, and 200 Gbps. Expanded I/O capacity is achieved by using up to 6 I/O slots. Furthermore, the Cisco ASR 1013 chassis is designed to achieve up to 360 Gbps of total bandwidth, giving enterprise customers as well as service providers the flexibility to add capacity as needed.

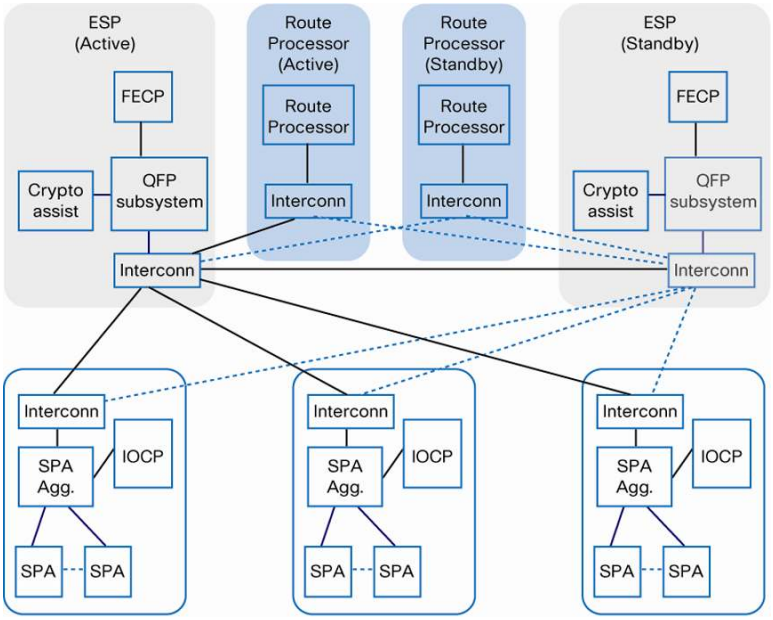
High-Level System Architecture

You can partition the Cisco ASR 1000 Series Routers from a very high level into three elements: network control (route processor), data-plane forwarding (ESP), and network I/O (SIP).

One of the main differentiators of the platform is the logical and physical isolation of these planes in the system for nonstop operation and various types of resilience. For example, the routing plane is completely isolated from the forwarding plane (in fact, they are separate cards), so that loading of one does not affect the other.

Figure 1 graphically depicts the Cisco ASR 1006 Router with two route processors, two ESP, and three SIPs.

Figure 1. Cisco ASR 1006 Aggregation Services Router with Two Route Processors, Two ESPs, and Three SIPs



Route Processor

The route processor is based on a modern PowerPC CPU subsystem running Cisco IOS Software and platform-specific code, including Cisco IOS XE Software. The route processor manages the following types of traffic:

- Management traffic coming through the Gigabit Ethernet management port on the route processor
- Punt traffic in the system (through the ESP), which includes all control-plane traffic received on any SPAs
- Older protocol traffic, such as DECnet, Internet Packet Exchange (IPX), and so on

In addition, the route processor is responsible for the chassis management, including activation and initialization of the other cards, selection and switchover of active as opposed to standby cards, image management and

distribution, logging facilities, distribution of user-configuration information, and alarm control. The route processor houses the console, auxiliary console, two universal-serial-bus (USB) ports, bootflash, hard disk drive (HDD), Building Integrated Timing Supply (BITS) reference clock input (RJ-45), and the Gigabit Ethernet management port.

Cisco ASR 1000 Routers support four types of route processors: the Cisco ASR 1000 RP1 (ASR1000-RP1), the Cisco ASR 1000 RP2 (ASR1000-RP2), and the route processors that are built into the Cisco ASR 1001 and ASR 1002-X, both of which are different from RP1 and RP2. The RP1 and RP2 route-processor modules are supported in the Cisco ASR 1004 (RP1 and RP2), ASR 1006 (RP1 and RP2), and ASR 1013 (RP2 only).

Note: For the Cisco ASR 1002 and ASR 1002 Fixed chassis, the RP1 is integrated.

- The modular route processor RP1 is based on a general-purpose CPU with 1.5 GHz. It has a 32-bit Cisco IOS XE Operating System. It ships now with 4 GB of memory, 1 GB of embedded USB (eUSB; bootflash and nonvolatile RAM [NVRAM]), and a 40-GB hard drive for mass storage. Booting Cisco IOS XE Software images from the HDD on RP1 has been supported since Cisco IOS XE Software Release 3.3S. The modular RP1 is supported in the Cisco ASR 1004 and ASR 1006 Routers.
- The integrated route processor RP1 is the same as the modular RP1 except that it is integrated in the Cisco ASR 1002 and ASR 1002 Fixed Routers; it is not field-upgradable and it does not come with a HDD, but it comes with 8-GB eUSB memory support (partitioned: two 32 MB of memory for NVRAM and the rest for mass storage).
- The modular route processor RP2 is based on a dual-core 2.66-GHz processor. It has a 64-bit Cisco IOS XE Operating System. It comes with either 8 or 16 GB of maximum memory, with 2 GB of eUSB (bootflash and NVRAM) and an 80-GB hard drive for mass storage. Booting Cisco IOS XE Software images from the HDD on the RP2 has been supported since Cisco IOS XE Software Release 3.3S. The modular RP2 is supported in Cisco ASR 1004, ASR 1006, and ASR 1013 Routers.
- Both Cisco ASR 1001 and ASR 1002-X have their own integrated route processors that are similar to RP2 in terms of scalability numbers for the control plane. However, they are different in their processor and memory options. The Cisco ASR 1001 is based on a dual-core 2.2-GHz processor, whereas the Cisco ASR 1002-X is based on a quad-core 2.13-GHz processor, both with three memory options (4- [default], 8- and 16-GB memory). Both come with 8-GB eUSB memory support (partitioned: two 32-MB memory modules for NVRAM and the rest for mass storage). The Cisco ASR 1001 HDD model comes with an IDC that is a 160-GB hard disk drive; the Cisco ASR 1002-X also offers optional 160-GB HDD.

Note: Booting from the IDC HDD is not supported for the Cisco ASR 1001.

Embedded Services Processor

The ESP provides the centralized forwarding engine responsible for most of the data-plane processing tasks. All network traffic through the Cisco ASR 1000 Series Router flows through the ESP. It performs all the traditional baseline router packet operations, including MAC classification, Layer 2 and the various Layer 3 forwarding protocols, QoS classification, policing, shaping, load balancing, security access control lists (ACLs), VPN, and NetFlow.

The ESP executes more complex features such as firewalls, Network-Based Application Recognition (NBAR), NAT, FPM, numerous tunneling protocols, cryptography, and header and payload compression. It also performs the egress-packet buffering, queuing, and scheduling functions for the system.

The ESP, at a high level, can be divided into two subsystems:

- Cisco QuantumFlow Processor
- Control processor and other related circuitry

The Cisco QuantumFlow Processor is really the foundation of the Cisco ASR 1000 Series Router platform; it can be further divided into two blocks, the Cisco QuantumFlow Processor Engine and the Cisco QuantumFlow Processor Traffic Manager subsystems. The engine is where all the Cisco IOS Software feature processing takes place, whereas the traffic manager performs various QoS functions for both transit traffic and the traffic destined to the router.

The Cisco QuantumFlow Processor is the Cisco in-house, custom-built network processor that truly sets a new benchmark for data forwarding at tens of gigabit rates with various services configured. The processor includes 40 to 128 multithreaded packet-processing cores along with a buffering, queuing, and scheduling subsystem (the traffic manager) to perform buffering and scheduling at wire speed.

The Cisco QuantumFlow Processor is the industry's first fully integrated and programmable router chip designed to unify massive parallel processing, integrated QoS, and advanced memory management, while at the same time offering integral service delivery and programmability.

Figures 2 and 3 show the Cisco ASR 1000 Series system architecture.

Figure 2. Cisco ASR 1000 Series System Architecture: Distributed Control

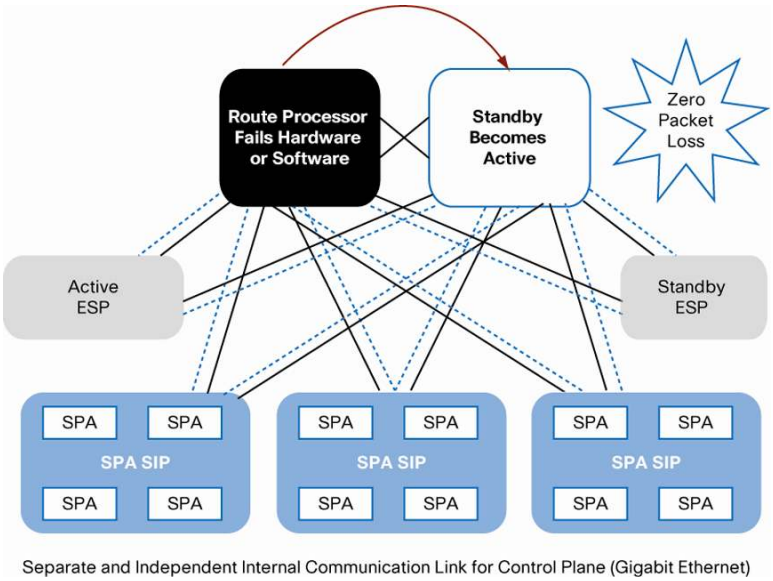
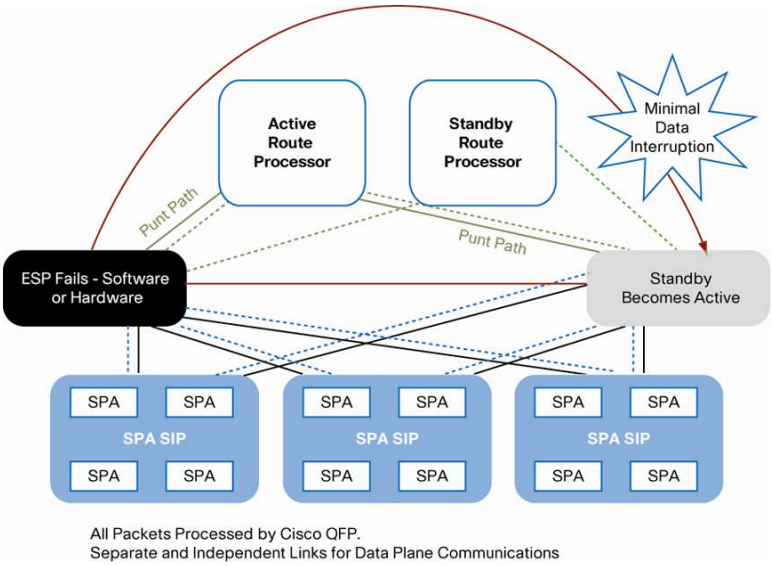


Figure 3. Cisco ASR 1000 Series System Architecture: Centralized Data



As shown in Figure 3, ESP-to-ESP failover results in minimal data interruption (<50 ms), whereas route processor-to-route processor failover results in no data interruption at all (0 packet loss), surpassing even the Automatic Protection Switching (APS) gold standard for nonstop operation.

SPA Interface Processor

The Cisco ASR 1000 Series SIP, unlike the SIPs for the Cisco 7600 Router and Cisco Catalyst® 6500 Switch, does not participate in packet forwarding; it is the housing for the SPAs in the system. Each SIP can take up to four half-height SPAs, two full-height SPAs, or a combination.

The Cisco ASR 1000 SIP also provides packet prioritization for ingress packets from the SPAs and a large ingress burst absorption buffer for ingress packets awaiting transfer to the ESP for processing. The egress buffering is centralized on the traffic manager and also provided in the form of egress queues on the SIP.

The Cisco ASR 1000 SIP also houses its own control processor to run various managers on the card, including the SPA drivers. Each SPA bay runs its own SPA driver, resulting in a completely hitless (to other SPAs in the same SIP or other SIPs) ISSU for the SPA drivers in the system in case of upgrade or downgrade.

The Cisco ASR 1000 Series has two types of SIPs: SIP10 and SIP40, which enable 10 and 40 Gbps of aggregate bandwidth per slot, respectively. The SIP10 is built into the Cisco ASR 1001, ASR 1002 Fixed, and ASR 1002 Router chassis. The Cisco ASR 1004 and ASR 1006 Routers support SIP10 as a modular component. The Cisco ASR 1004, ASR 1006, and ASR 1013 Routers support the SIP40 as a modular component.

For more information about the SIP10 and SIP40, please visit: http://www.cisco.com/en/US/prod/collateral/routers/ps9343/qa_C67-443177_ps6267_Products_Q_and_A_Item.html.

The Cisco ASR 1000 Series Routers can prioritize traffic not only at the ESP level, but also throughout the system by configuring ingress and egress classification. Buffering (ingress and egress) coupled with back pressure to and from the ESP is provided in the system to deal with oversubscription.

The Cisco ASR 1000 Series Routers can be oversubscribed and considered a valid configuration, unlike Cisco 7200VXR Series Routers, where bandwidth points are enforced to avoid any possible oversubscription.

Shared Port Adapter

SPAs used in Cisco ASR 1000 Series Routers are the same SPAs as those used in the Cisco 7600, Cisco Catalyst 6500, Cisco gigabit switch routers (GSRs), and the Cisco CRS-1 Carrier Routing System. Hence, Cisco ASR 1000 Series Routers extend the value and investment protection for the network I/O in the form of SPAs.

Following is an **excerpt** of the list of SPAs that are supported as of Cisco IOS XE Software Release 2.2 on the Cisco ASR 1000 Series Routers:

- 8-port Gigabit Ethernet
- 1-port 10 Gigabit Ethernet
- 2- and 5-port Gigabit Ethernet and 10-port Gigabit Ethernet
- 4- and 8-port Fast Ethernet
- 8-port T1/E1
- 2- and 4-port T3/E3
- 2- and 4-port OC-3/STM-1 PoS
- 1-port OC-12/STM-4 PoS
- 2- and 4-port Channelized T3
- 4-port Serial (12-in-1)
- 1-port Channelized STM-1
- 2- and 4-port OC-48 PoS/Resilient Packet Ring (RPR) (PoS mode only)

For the complete list of supported SPAs, please refer to the Cisco ASR 1000 Global Price List. You can also contact your local Cisco account representative.

Additional SPA support is planned for later Cisco IOS XE Software releases.

Cisco ASR 1000 Series Software Architecture

The Cisco ASR 1000 Series Router design is based around a distributed control plane to add another level of resilience in the system. A separate control processor is included on each major component of the router system (route processor, ESP, and SIP) that manages the local resources and data structures.

The various processors in the platform have the following basic roles:

- Route processor:
  - Runs the router control plane (Cisco IOS Software), including processing of network control packets, computation of routes, and connection setup
  - Manages ports and indicators, command-line interface (CLI), alarms, and network
  - Downloads code to other components in the system
  - Performs active route-processor and ESP selection and standby synchronization
  - Performs logging facilities, onboard failure logging, and statistics aggregation

- ESP control processor:
  - Allows for direct CPU access to the forwarding-engine subsystem (that is, Cisco QuantumFlow Processor) co-residing on the ESP
  - Manages Cisco QuantumFlow Processor chipset
- SIP control processor:
  - Provides direct CPU access to SPAs plugged into the given SIP for control purposes
  - Handles SPA online-insertion-and-removal (OIR) events
  - Runs SPA drivers for initializing and configuring SPAs

As mentioned previously, the control CPUs in the Cisco ASR 1000 Series Router chassis (route processor, ESP control processor, and SIP control processor) run Cisco IOS XE Software, an operating system consisting of a Linux-based kernel and a common set of OS-level utility programs including Cisco IOS Software running as a user process on the route-processor card. Cisco IOS XE Software is based on the Cisco IOS Software Release 12.2SR train (with reference to Cisco IOS XE Software Releases 2.1 through 2.6). Starting with Cisco IOS XE Software Release 3.1S, Cisco IOS XE Software is based on the Cisco IOS Software Release 15S train.

The Cisco IOS Software has no direct access to the hardware components in the system and is largely isolated from the platform architecture. This concept allows for different types of redundancy and modularity in the system. Even if the Cisco IOS Software is down (or has crashed), router administration personnel can still access the console and auxiliary console, and they can even perform Telnet, Secure Shell (SSH) Protocol, and Secure Sockets Layer (SSL) in the system and restart the Cisco IOS Software or perform Trivial File Transfer Protocol (TFTP), and access other relevant information through the route-processor management port.

Cisco IOS Software is responsible for the control-plane processing, including processing network configuration and the CLI, processing or directing Simple Network Management Protocol (SNMP) requests, running routing protocols, computing routes, managing interfaces and tunnels, and setting up sessions.

Two Cisco IOS Software daemons on the Cisco ASR 1001, ASR 1002 Fixed, ASR 1002, ASR 1002-X, and ASR 1004 Routers provide Cisco IOS Software redundancy and therefore limited interruption on Cisco IOS Software failure or upgrade. The normal Cisco IOS Software Nonstop Forwarding with Stateful Switchover (NSF/SSO) support is used to shadow state from the active Cisco IOS Software daemon to a standby Cisco IOS Software instance, whether on the same route processor or a different route processor (in the case of Cisco ASR 1006 and ASR 1013 chassis). Cisco IOS Software NSF/SSO also reestablishes state upon Cisco IOS Software restart, resulting in a software high-availability option for all Cisco ASR 1000 Series Router chassis.

Because the Cisco ASR 1006 and ASR 1013 chassis can accommodate two route processors, each route processor runs its own copy of Cisco IOS Software.

With the Cisco IOS XE Software for the Cisco ASR 1000 Series, Cisco offers a new software release every 4 months with new features, and two rebuilds for each major release. In the case of standard supported releases, two rebuilds are offered, with the first rebuild 2 months after FCS of the release and the second rebuild 4 months after FCS for bug fixes. Extended supported releases come with four rebuilds. For more details, please refer to the Cisco IOS XE Software product bulletin at: http://www.cisco.com/en/US/prod/collateral/routers/ps9343/product_bulletin_c25-448258.html.

Cisco and Partner Services Deliver Borderless Network Architecture

Enable the Cisco Borderless Network Architecture and the business solutions that use that architecture with smart, personalized services from Cisco and our partners. Backed by deep networking expertise and a broad ecosystem of partners, these services can help you plan, build, and manage a network that allows you to expand geographically, embrace new business models, and promote business innovation. Whether you plan to move to a Borderless Network Architecture, solve specific business problems, or improve operational efficiency, we have a service that can help you get the most from your IT environment. For more information, visit: http://www.cisco.com/go/services.

Summary

The Cisco ASR 1000 Series Aggregation Services Routers constitute a true carrier-class system consisting of forwarding-plane redundant components, high availability, ISSU for Cisco IOS Software with NSF/SSO, and SPA drivers. These routers take advantage of the flexibility and faster services delivery based on the Cisco QuantumFlow Processor, at 2.5 Gbps up to 200 Gbps.

The Cisco ASR 1000 Series Routers offer many technological innovations while providing innovative carrier-class capabilities. These new midrange routers have advanced forwarding engines and multiple processors, and they take advantage of the proven features of Cisco IOS Software. Both enterprises and service providers can benefit from the modular design and advanced architecture of these routers.

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