Cisco 4000 Family Integrated Services Router

Cisco® 4000 Family Integrated Services Routers (ISRs) form an intelligent WAN platform that delivers the performance, security, and convergence capabilities that today's branch offices need.

Product Overview

The Cisco 4000 Family Integrated Services Router (ISR) revolutionizes WAN communications in the enterprise branch. With new levels of built-in intelligent network capabilities and convergence, it specifically addresses the growing need for application-aware networking in distributed enterprise sites. These locations tend to have lean IT resources. But they often also have a growing need for direct communication with both private data centers and public clouds across diverse links, including Multiprotocol Label Switching (MPLS) VPNs and the Internet.

The Cisco 4000 Family contains five platforms: the 4451, 4431, 4351, 4331, and 4321 ISRs.

Figure 1. Cisco 4000 Series Integrated Services Routers

Features and Benefits

Cisco 4000 Family ISRs provide you with Cisco® Intelligent WAN (IWAN) software features and a converged branch infrastructure. Along with superior throughput, these capabilities form the building blocks of next-generation branch-office WAN solutions.

Cisco Intelligent WAN (IWAN)

Cisco IWAN is a set of intelligent software services that allow you to reliably and securely connect users, devices, and branch office locations across a diverse set of WAN transport links. IWAN-enabled routers like the ISR 4000 dynamically route traffic across the "best" link based on up-to-the-minute application and network conditions for great application experiences. You get tight control over application performance, bandwidth usage, data privacy, and availability of your WAN links - control that you need as your branches conduct greater volumes of mission-critical business.

Cisco Converged Branch Infrastructure

The Cisco 4000 Series ISRs consolidate many must-have IT functions, including network, compute, and storage resources. The high-performance, integrated routers run multiple concurrent IWAN services, including encryption, traffic management, and WAN optimization, without slowing your data throughput. And you can activate new services on demand through a simple licensing change.

Table 1 breaks out many of the features and benefits of the Cisco 4000 Family that create an intelligent WAN and a converged branch infrastructure.

Table 1. Cisco 4000 Family ISR General Feature Highlights

Business Requirement(s)	Feature/Solution
Performance ● Throughput ● Service reliability	● Concurrent software services at speeds up to 2 Gbps. Backplane architecture supports high-bandwidth module-to-module communication at speeds up to 10 Gbps. ● A distributed multicore architecture with the industry's first internal services plane. ● Remote installation of application-aware services, which run identically to their counterparts in dedicated appliances.
Lower WAN expenditures	● Embedded IWAN solution for creating lower-cost, business-class Internet connections.
Pay-as-you-grow ● Performance upgrade model ● Investment protection ● CapEx budget management	● Router capacity can be increased with a remote performance-on-demand license upgrade (no hardware upgrade) for exceptional savings.
Superior and secure user application experiences	● ISR-AX "Application Experience" software bundle with advanced routing and network monitoring services. ● Dynamic Multipoint VPN (DMVPN), zone-based firewalls, and Cisco Cloud Web security protect data, authentication credentials, and transmissions not backhauled through the data center. ● Secure boot feature performs hardware-based authentication of the bootloader software to prevent malicious or unintended software from booting on the system. ● Code signing verifies digital signatures of executables prior to loading to prevent execution of altered or corrupted code. ● Hardware authentication protects against hardware counterfeiting by using an on-board tamper-proof silicon, including field replaceable modules. If authentication fails, the module is not allowed to boot.
IT consolidation, space savings, and improved total cost of ownership (TCO)	● Single converged branch platform integrates routing, switching, virtual server, storage, security, unified communications, WAN optimization, and performance management tools.
Business continuity and increased resiliency	● ISR 4400 Series models (4451 and 4431 ISRs) support dual integrated power supplies for backup. The entire ISR 4000 Family supports optional power supply capable of delivering additional PoE power to endpoints. ● Modular network interfaces with diverse connection options for load-balancing and network resiliency. ● Modular interfaces with online removal and insertion (OIR) for module upgrades without network disruption. ● Cisco Unified Survivable Remote Site Telephony (SRST), which serves as a resiliency complement to Cisco Hosted Collaboration Solution (HCS), a Cisco cloud-based UC service. ● Support for multiple, diverse access links: T1/E1, T3/E3, Serial, xDSL, Gigabit and Ten-Gigabit Ethernet.
Lower telephony costs with VoIP and rich media experiences	● High-performance analog/digital gateway, allowing VoIP over less expensive Session Initiation Protocol (SIP) trunks. ● Integrated IP PBX (Cisco Unified Communications Express) and Session Border Controller (Cisco Unified Border Element, or CUBE).
Easier manageability and support	● Single, universal software image for all features and performance-on-demand licensing flexibility. ● No additional services and support needed for compute and storage. ● Supported by Cisco and third-party management tools, with programmability and automation.

Platform Architecture

Table 2 lists the primary hardware architectural features and benefits of the Cisco 4000 Family. The routers run modular Cisco IOS XE Software, widely deployed in the world's most demanding networks. The software's comprehensive portfolio of services spans multiple technology areas, including security, WAN optimization, app and network quality of service (QoS), and embedded management.

Table 2. Architectural Highlights

Architectural Features	Benefits/Description
Multicore processors	• High-performance multicore processors support high-speed WAN connections. The data plane uses an emulated Flow Processor (FP) that delivers application-specific integrated circuit (ASIC)-like performance that does not degrade as services are added.
Embedded IP Security (IPsec) VPN hardware acceleration	• Increases scalability. When combined with an optional Cisco IOS XE Software Security license, enables WAN link security and VPN services.
Integrated Gigabit Ethernet ports	• The Cisco 4000 Family provides up to four built-in 10/100/1000 Ethernet ports for WAN or LAN. • Based on the platform, some of the 10/100/1000 Ethernet ports can support Small Form-Factor Pluggable (SFP)-based connectivity in addition to RJ-45 connections, enabling fiber or copper connectivity. • Optionally, depending on the platform, up to 30W PoE+ can be enabled on two of the built-in front panel Gigabit Ethernet interfaces to provide power to external devices such as fourth-generation (4G) LTE routers. • An additional dedicated Gigabit Ethernet port is provided for device management.
USB-based console access	• A mini type-B USB console port supports management connectivity when traditional serial ports are not available. • Traditional console and auxiliary ports are also available.
Optional integrated power supply for distribution of PoE	• An optional upgrade to the internal power supply provides inline power (802.3af-compliant PoE or 802.3at-compliant PoE+) to optional integrated switch modules. • Redundant PoE conversion modules provide an additional layer of fault tolerance.
Optional integrated redundant power supply (RPS)	• For the ISR 4400 Series, power redundancy is available by installing an optional integrated RPS for decreasing network downtime and protecting the network from power failures. • Optional PoE boost mode increases total PoE capacity to up to 1000W.
Cisco Enhanced Services Module (SM-X)	• Each service-module slot offers high data-throughput capability of up to 10 Gbps toward the system and up to 1 Gbps to other module slots. • Support for both single- and double-wide service modules provides flexibility in deployment options. • An SM-X slot can be converted into a Network Interface Module (NIM) slot using an optional carrier card. • Service modules support online insertion and removal (OIR), avoiding network disruption when installing new or replacement modules.
Cisco Network Interface Modules (NIMs)	• Up to three integrated NIM slots on the Cisco 4000 Family allow for flexible configurations. • Each NIM slot offers high-data-throughput capability, up to 1 Gbps toward the route processor and to other module slots. • NIMs support OIR. • Special NIMs add support solid-state drives (SSDs) and hard disk drives (HDDs).
Cisco Integrated Services Card (ISC) slot on motherboard	• Integrated Services Card natively supports the new Cisco High-Density Packet Voice Digital Signal Processor Modules (PVDM4s), providing greater-density rich-media voice. • Each Integrated Services Card slot connects to the system architecture through an up-to 2-Gbps link. • Future modules can be hosted on the Integrated Services Card slot, improving system functions.
Flash memory support	• A single flash memory slot is available to support high-speed storage densities, upgradable to up to 32 GB. • Two USB type A 2.0 ports provide secure token capabilities and convenient storage.
DRAM	• For the ISR 4400 Series, the default control-plane memory is 4 GB, upgradable to 16 GB to provide additional scalability for control-plane features. The default data-plane memory is 2 GB. • For the ISR 4300 Series, the default memory is 4 GB, upgradable to 16 GB to provide additional scalability.

Managing your Cisco ISR 4000 Family ISRs

The Cisco network management applications listed at the top of Table 3 are standalone products that can be purchased or downloaded to manage your Cisco network devices. The applications are built specifically for the different operational phases; select those that best fit your needs. Those management capabilities listed under the “Cisco IOS Software XE Embedded Management” heading are directly integrated into the routers’ software operating system.

Table 3. Network Management Solutions

Operational Phase	Application	Description
Device staging and configuration	Cisco Configuration Professional	• A GUI-based device-management tool for Cisco IOS and Cisco IOS XE Software-based access routers. This tool simplifies routing, firewall, VPN, unified communications, and WAN and LAN configuration through easy-to-use wizards.
Network-wide deployment, configuration, monitoring, and troubleshooting	Cisco Prime™ Infrastructure	• Offers comprehensive lifecycle management of wired and wireless access, campus, and branch-office networks, rich visibility into end-user connectivity, and application performance assurance. • Provides wired lifecycle functions such as inventory, configuration, and image management; automated deployment; compliance reporting; integrated best practices; and reporting.
Staging, deployment, and changes to configuration and image files	Cisco Configuration Engine	• A secure network management product that provides zero-touch image and configuration distribution through centralized, template-based management.
Context-aware security configuration and monitoring	Cisco Prime Security Manager	• Management tool for configuring and managing context-aware security. The application supports both single- and multi-device manager form factors. • Provides the ability to write and enforce the granular context-aware security policies.
Cisco Wide Area Application Service (WAAS) management	Cisco WAAS Central Manager	• The management tool for the WAAS (WAN optimization and application acceleration) integrated service. It provides a centralized mechanism for configuring WAAS features, reporting, and monitoring.
Cisco IOS XE Software Embedded Management Capabilities		
Feature	**Description**	
Cisco IOS Embedded Event Manager (EEM)	• A distributed and customized approach to event detection and recovery. • Offers the ability to monitor events and take informational, corrective, or any desired EEM action when the monitored events occur or when a threshold is reached.	
Cisco IOS XE IP Service-Level Agreements (IP SLAs)	• Helps assure the performance of new business-critical IP applications as well as IP services that use data and voice in an IP network	
SNMP, Remote Monitoring (RMON), syslog, NetFlow, IP Flow Information Export (IPFix)	• Network monitoring and accounting tools	
Cisco onePK	• Allows application developers to easily integrate the network with their applications	

Product Specifications

Table 4 lists the general product specifications for the Cisco 4000 Family routers.

Table 4. Specifications of Cisco 4000 Family Integrated Services Routers

Technical Specifications	Cisco 4451	Cisco 4431	Cisco 4351	Cisco 4331	Cisco 4321
Aggregate Throughput	1 Gbps to 2 Gbps	500 Mbps to 1 Gbps	200 Mbps to 400 Mbps	100 Mbps to 300 Mbps	50 Mbps to 100 Mbps
Total onboard WAN or LAN 10/100/1000 ports	4	4	3	3	2
RJ-45-based ports	4	4	3	2	2
SFP-based ports	4	4	3	2	1
Enhanced service-module slots	2	0	2	1	0
Doublewide service-module slots	1 (assumes no singlewide SM-X modules installed)	0	1 (assumes no singlewide SM-X modules installed)	0	0
NIM slots	3	3	3	2	2
OIR (all I/O modules)	Yes	Yes	Yes	Yes	Yes
Onboard ISC slot	1	1	1	1	1

Technical Specifications	Cisco 4451	Cisco 4431	Cisco 4351	Cisco 4331	Cisco 4321
Default memory double-data-rate 3 (DDR3) error-correction-code (ECC) DRAM (Combined control/services/data planes)	NA	NA	4 GB	4 GB	4 GB
Maximum memory DDR3 ECC DRAM (Combined control/services/data planes)	NA	NA	16 GB	16 GB	8 GB
Default memory DDR3 ECC DRAM (data plane)	2 GB	2 GB	NA	NA	NA
Maximum memory DDR3 ECC DRAM (data plane)	2 GB	2 GB	NA	NA	NA
Default memory DDR3 ECC DRAM (control/services plane)	4 GB	4 GB	NA	NA	NA
Maximum memory DDR3 ECC DRAM (control/services plane)	16 GB	16 GB	NA	NA	NA
Default flash memory	8 GB	8 GB	4 GB	4 GB	4 GB
Maximum flash memory	32 GB	32 GB	16 GB	16 GB	8 GB
External USB 2.0 slots (type A)	2	2	2	1	1
USB console port - type B mini (up to 115.2 kbps)	1	1	1	1	1
Serial console port - RJ45 (up to 115.2 kbps)	1	1	1	1	1
Serial auxiliary port - RJ45 (up to 115.2 kbps)	1	1	1	1	1
Power-supply options	Internal: AC, DC (roadmap) and PoE	Internal: AC, DC, and PoE	Internal: AC, DC (roadmap) and PoE	Internal: AC and PoE	External: AC and PoE
Redundant power supply	Internal: AC, DC (roadmap) and PoE	Internal: AC, DC, and PoE	N/A	N/A	N/A
Power Specifications					
AC input voltage	100 to 240 VAC autoranging	100 to 240 VAC autoranging	100 to 240 VAC autoranging	100 to 240 VAC autoranging	100 to 240 VAC autoranging
AC input frequency	47 to 63 Hz	47 to 63 Hz	47 to 63 Hz	47 to 63 Hz	47 to 63 Hz
AC input current range, AC power supply (maximum)	7.1 to 3.0A	3 to 1.3A	7.1 to 3.0A	3 to 1.3A	1.5 to 0.6A
AC input surge current	<50 A	60 A peak and less than 5 Arms per half cycle	60 A peak and less than 12 Arms per half cycle	60 A peak and less than 5 Arms per half cycle	90 A peak and less than 3 Arms per half cycle
Typical power (no modules) (watts)	158	65	48	42	36

Technical Specifications	Cisco 4451	Cisco 4431	Cisco 4351	Cisco 4331	Cisco 4321
Maximum power with AC power supply (watts)	450 (no PoE)	250 (no PoE)	430	250	125
Maximum power with PoE power supply (platform only) (watts)	1000 with PoE redundant 1450 with PoE boost no redundancy	500 with PoE redundant 1000 with PoE boost no redundancy	990	530	260
Maximum endpoint PoE power available from PoE power supply (watts)	500 W with optional redundancy	250 W with optional redundancy	500	250	120
Maximum endpoint PoE power capacity with PoE boost (watts)	950 W no redundancy	500 W no redundancy	N/A	N/A	N/A
Sizes and Weights					
Dimensions (H x W x D)	3.5 x 17.25 x 18.5 in (88.9 x 438.15 x 469.9 mm)	1.73 x 17.25 x 19.97 in (43.9 x 438.15 x 507.2 mm)	3.5 x 17.25 x 18.5 in (88.9 x 438.15 x 469.9 mm)	1.75 x 17.25 x 17.25 in (44.45 x 438.15 x 438.15 mm)	1.75 x 14.55 x 11.60 in (44.55 x 369.57 x 294.64 mm)
External Power Supply Dimensions (H x W x D)	N/A	N/A	N/A	N/A	2.95 x 1.18 x 6.10 in (75 x 30 x 155 mm)
Shipping Box Dimensions (H x W x D)	9.75 x 22.25 x 26 in (24.76 x 56.51 x 66.04 mm)	7.88 x 22.25 x 28.75 in (200.2 x 565.1 x 730.25 mm)	9.75 x 22.25 x 26 in (24.76 x 56.51 x 66.04 mm)	7.125 x 22.75 x 22.5 in (180.98 x 577.85 x 571.5 mm)	7.0 x 21.5 x 16.125 in (177.8 x 546.1 x 409.6 mm)
Rack height	2 rack units (2RU)	1 rack units (1RU)	2 rack units (2RU)	1 rack unit (1RU)	1 rack unit (1RU)
Rack-mount 19in. (48.3 cm) EIA	Included	Included	Included	Included	Included
Rack-mount 23in. (58.4 cm) EIA	Optional	Optional	Optional	Optional	N/A
Wall-mount	No	Yes	No	Yes	Mounting holes under chassis
Weight with 1, 450-WAC power supply (no modules)	28.8 lb (13.1 kg)	N/A	28.8 lb (13.1 kg)	N/A	N/A
Weight with 1 1,000-WAC power supply+ 1 PoE power module (no other modules)	30.6 lb (13.9 kg)	N/A	29.0 lb (13.2 kg)	N/A	N/A
Weight with AC PS (no modules)	N/A	18.5 lb (8.4 kg)	N/A	13.5 lb (6.2 kg)	7.7 lb (3.5 kg) + 1.2 lb (0.66 kg) external PS
Weight with AC PS with POE (no modules)	N/A	18.6 lb (8.4 kg)	N/A	14.1 lb (6.4 kg)	N/A
Typical weight (fully loaded with modules)	42.7 lb (19.4 kg)	22.4 lb (10.2 kg)	37.7 lb (17.1 kg)	16.1 lb (7.3 kg)	9.14 lb (4.2 kg) + 1.2 lb (0.66 kg) external PS
Packaging Weight	6.4 lb (2.9 kg)	5.9 lb (2.7 kg)	6.4 lb (2.9 kg)	4.6 lb (2.1 kg)	2.2 lb (1 kg)
Airflow	I/O side to bezel side	I/O side to bezel side	I/O side to bezel side	I/O side to bezel side	Right I/O side to Left I/O side
Environmental Specifications					
Operating Conditions					
Temperature	32 to 104ºF (0 to 40ºC)	32 to 104ºF (0 to 40ºC)	32 to 104ºF (0 to 40ºC)	32 to 104ºF (0 to 40ºC)	32 to 104ºF (0 to 40ºC)

Technical Specifications	Cisco 4451	Cisco 4431	Cisco 4351	Cisco 4331	Cisco 4321
Altitude (China)	0 – 6,560 ft. (0 – 2,000 m)	0 – 6,560 ft. (0 – 2,000 m)	0 – 6,560 ft. (0 – 2,000 m)	0 – 6,560 ft. (0 – 2,000 m)	0 – 6,560 ft. (0 – 2,000 m)
Altitude (Rest of the world)	0 – 10,000 ft. (0 – 3,050 m)	0 – 10,000 ft. (0 – 3,050 m)	0 – 10,000 ft. (0 – 3,050 m)	0 – 10,000 ft. (0 – 3,050 m)	0 – 10,000 ft. (0 – 3,050 m)
Relative humidity	5% to 85%	5% to 85%	5% to 85%	5% to 85%	5% to 85%
Short-term humidity	5% to 90%, not to exceed 0.024 kg water/kg of dry air	5% to 90%, not to exceed 0.024 kg water/kg of dry air	5% to 90%, not to exceed 0.024 kg water/kg of dry air	5% to 90%, not to exceed 0.024 kg water/kg of dry air	5% to 90%, not to exceed 0.024 kg water/kg of dry air
Acoustics: Sound pressure (Typical/maximum)	50.6/73.1 dBA	54.3/79.1 dBA	50.6/73.1 dBA	52.8/74.8 dBA	24.2/51.9 dBA
Acoustics: Sound power (Typical/maximum)	58.2/78.8 dBA	57.2/80.8 dBA	58.2/78.8 dBA	61.2/81.6 dBA	31.9/59.9 dBA
Nonoperating Conditions					
Temperature	-40 to 158ºF (-40 to 70ºC)	-40 to 158ºF (-40 to 70ºC)	-40 to 158ºF (-40 to 70ºC)	-40 to 158ºF (-40 to 70ºC)	-40 to 158ºF (-40 to 70ºC)
Relative humidity	5% to 95%	5% to 95%	5% to 95%	5% to 95%	5% to 95%
Altitude	15,584 ft (4750m)	15,584 ft (4750m)	15,584 ft (4750m)	15,584 ft (4750m)	15,584 ft (4750m)
Regulatory and Compliance					
Safety	UL 60950-1 CAN/CSA C22.2 No. 60950-1 EN 60950-1 AS/NZS 60950-1 IEC 60950-1	UL 60950-1 CAN/CSA C22.2 No. 60950-1 EN 60950-1 AS/NZS 60950-1 IEC 60950-1 GB-4943	UL 60950-1 CAN/CSA C22.2 No. 60950-1 EN 60950-1 AS/NZS 60950-1 IEC 60950-1 GB-4943	UL 60950-1 CAN/CSA C22.2 No. 60950-1 EN 60950-1 AS/NZS 60950-1 IEC 60950-1 GB-4943	UL 60950-1 CAN/CSA C22.2 No. 60950-1 EN 60950-1 AS/NZS 60950-1 IEC 60950-1 GB-4943
EMC	47 CFR, Part 15 ICES-003 Class A EN55022 Class A CISPR22 Class A AS/NZS 3548 Class A VCCI V-3 CNS 13438 EN 300-386 EN 61000 (Immunity) EN 55024, CISPR 24 EN50082-1 SD/EMI KN22, KN24	47 CFR, Part 15 ICES-003 Class A EN55022 Class A CISPR22 Class A AS/NZS 3548 Class A VCCI V-3 CNS 13438 EN 300-386 EN 61000 (Immunity) EN 55024, CISPR 24 EN50082-1 KN22, KN24	47 CFR, Part 15 ICES-003 Class A EN55022 Class A CISPR22 Class A AS/NZS 3548 Class A VCCI V-3 CNS 13438 EN 300-386 EN 61000 (Immunity) EN 55024, CISPR 24 EN50082-1 KN22, KN24	47 CFR, Part 15 ICES-003 Class A EN55022 Class A CISPR22 Class A AS/NZS 3548 Class A VCCI V-3 CNS 13438 EN 300-386 EN 61000 (Immunity) EN 55024, CISPR 24 EN50082-1 KN22, KN24	ICES-003 Class A EN55022 Class A CISPR22 Class A AS/NZS 3548 Class A VCCI V-3 CNS 13438 EN 300-386 EN 61000 (Immunity) EN 55024, CISPR 24 EN50082-1 KN22, KN24

Technical Specifications	Cisco 4451	Cisco 4431	Cisco 4351	Cisco 4331	Cisco 4321
Telecom	T1 IC CS-03:2004 TIA-968-B:2009 HKTA 2028:2010 HKTA 2017:2010 HKTA 2015: 2006 G.703:2001 ID0002:2007 IS6100:2004 DSPR Gray Book:2000 DSPR Technical Condition: 2004 E1 AS/ACIF S016: 2001 AS/ACIF S038: 2001 G.703:2001 TBR 4:1995 TBR 12:1993 TBR 13:1996 RRA 2009-38 (RRL 2005-96) IDA TS DLCN:2011 IDA TS ISDN PRA:2005 IS6100: 2004 PTC 220:2008 Ethernet IEEE 802.3 ANSA X3.263	TIA-968-B CS-03 ANSI T1.101 ITU-T G.823, G.824 IEEE 802.3 RTTE Directive Homologation requirements vary by country and interface type. For specific country information, refer to the online approvals data base at: http://www.ciscofax.com.	TIA-968-B CS-03 ANSI T1.101 ITU-T G.823, G.824 IEEE 802.3 RTTE Directive Homologation requirements vary by country and interface type. For specific country information, refer to the online approvals data base at: http://www.ciscofax.com.	TIA-968-B CS-03 ANSI T1.101 ITU-T G.823, G.824 IEEE 802.3 RTTE Directive Homologation requirements vary by country and interface type. For specific country information, refer to the online approvals data base at: http://www.ciscofax.com.	TIA-968-B CS-03 ANSI T1.101 ITU-T G.823, G.824 IEEE 802.3 RTTE Directive Homologation requirements vary by country and interface type. For specific country information, refer to the online approvals data base at: http://www.ciscofax.com.
Cisco IOS XE Software					
Protocols	IPv4, IPv6, static routes, Routing Information Protocol Versions 1 and 2 (RIP and RIPv2), Open Shortest Path First (OSPF), Enhanced IGRP (EIGRP), Border Gateway Protocol (BGP), BGP Router Reflector, Intermediate System-to-Intermediate System (IS-IS), Multicast Internet Group Management Protocol Version 3 (IGMPv3), Protocol Independent Multicast sparse mode (PIM SM), PIM Source Specific Multicast (SSM), RSVP, CDP, ERSPAN, IPSLA, CNS, Call Home, EEM, IKE, ACL, EVC, DHCP, FR, DNS, LISP, OTV, HSRP, RADIUS, AAA, AVC, Distance Vector Multicast Routing Protocol (DVMRP), IPv4-to-IPv6 Multicast, MPLS, Layer 2 and Layer 3 VPN, IP sec, Layer 2 Tunneling Protocol Version 3 (L2TPv3), Bidirectional Forwarding Detection (BFD), IEEE802.1ag, and IEEE802.3ah				
Encapsulations	Generic routing encapsulation (GRE), Ethernet, 802.1q VLAN, Point-to-Point Protocol (PPP), Multilink Point-to-Point Protocol (MLPPP), Frame Relay, Multilink Frame Relay (MLFR) (FR.15 and FR.16), High-Level Data Link Control (HDLC), Serial (RS-232, RS-449, X.21, V.35, and EIA-530), and PPP over Ethernet (PPPoE)				
Traffic management	QoS, Class-Based Weighted Fair Queuing (CBWFQ), Weighted Random Early Detection (WRED), Hierarchical QoS, Policy-Based Routing (PBR), Performance Routing, and NBAR.				
Cryptographic Algorithms	Encryption: DES, 3DES, AES-128 or AES-256 (in CBC and GCM modes) ; Authentication: RSA (748/1024/2048 bit), ECDSA (256/384 bit) ; Integrity: MD5, SHA, SHA-256, SHA-384, SHA-512				

Cisco IOS Software Licensing and Packaging

Universal IOS XE Image

A single Cisco IOS XE Universal image encompassing all functions is delivered with the platform. Advanced features can be enabled by simply activating a software license on the Universal image. Technology packages and feature licenses, enabled through right-to-use licenses, simplify software delivery and decrease the operational costs of deploying new features.

Four major technology licenses are available on the Cisco 4000 Family; these licenses can be activated through the Cisco software activation process identified at http://www.cisco.com/go/sa. The following licenses are available:

- IP Base: This technology package is available as default.
- Application Experience (APP): This license includes data and application performance features.
- Unified Communications: This license includes voice features.
- Security (SEC) or Security with No Payload Encryption (SEC-NPE): This license includes features for securing network infrastructure.

The Cisco 4000 Series has a performance-on-demand license to increase the base forwarding throughput with no hardware changes. Also present is the High Security (HSEC) license, which removes the curtailment enforced by the U.S. government export restrictions on the encrypted tunnel count and encrypted throughput. The HSECK9 license is a separately required license for a feature to have full crypto functionality. Without the HSECK9 license, only 225 secure tunnels and 85 Mbps of crypto bandwidth would be available.

For additional information and details about Cisco IOS Software licensing and packaging on the Cisco 4000 Family, please visit http://www.cisco.com/c/en/us/td/docs/routers/access/4400/software/configuration/guide/isr4400swcfg.pdf.

Cisco ISR 4000 Bundles

Cisco ISR 4000 is available is several attractive bundles. The AX bundles integrate Cisco Wide Area Application Services (WAAS), Security (SEC), and Data (DATA) licenses into a single bundle that is simple to order, configure, and deploy. For customers who are also interested in voice along with all of these features, AXV presents an attractive option. See Table 5 for details.

Table 5. Cisco ISR 4000 Feature Bundles

Bundles	Features
Application Experience with Voice (AXV)	AX + Voice
Voice with Security (VSEC)	Voice + Security
Application Experience (AX)	IP Base + Security + advanced networking protocols: L2TPv3, BFD, MPLS, VRF, VXLAN Application Experience: PfRv3, WAAS with AppNav, NBAR2, AVC, IP SLA Hybrid Cloud Connectivity: LISP, OTV, VPLS, EoMPLS Intelligent Web Caching: Akamai Connect
Voice (V)	IP Base + Unified Communications: CME, SRST, CUBE
Security (SEC)	IP Base + Advanced Security: Zone Based Firewall, IPSec VPN, EZVPN, DMVPN, FlexVPN

More information on ISR AX bundles is available at http://www.cisco.com/go/ax.

A pay-as-you-grow licensing model lets you increase the performance level for the platforms from the base level to a higher level. So you can purchase at an attractive entry-level price point and increase the performance level as your business demand grows. Table 6 describes the performance licenses.

Table 6. Cisco ISR 4000 Performance Licenses

Platform	Performance-on-Demand License	Features
ISR4451	FL-44-PERF-K9	Increases the performance from base performance 1 Gbps to 2 Gbps
ISR4431	FL-44-PERF-K9	Increases the performance from base performance 500 Mbps to 1 Gbps
ISR4351	FL-4350-PERF-K9	Increases the performance from base performance 200 Mbps to 400 Mbps

Platform	Performance-on-Demand License	Features
ISR4331	FL-4330-PERF-K9	Increases the performance from base performance 100 Mbps to 300 Mbps
ISR4321	FL-4320-PERF-K9	Increases the performance from base performance 50 Mbps to 100 Mbps

Ordering Information

The Cisco ISR 4000 Family is orderable and shipping. To place an order, refer to Table 7 below and visit the Cisco Ordering Home Page.

Table 7. Cisco ISR 4000 Series Ordering Information

Product Name	Product Description
ISR4451-X/K9	ISR 4451 with 4 onboard GE, 3 NIM slots, 1 ISC slot, 2 SM slots, 8 GB Flash Memory default, 2 GB DRAM default (data plane), 4 GB DRAM default (control plane)
ISR4431/K9	ISR 4431 with 4 onboard GE, 3 NIM slots, 1 ISC slot, 8GB Flash Memory default, 2 GB DRAM default (data plane), 4 GB DRAM default (control plane)
ISR4351/K9	ISR 4351 with 3 onboard GE, 3 NIM slots, 1 ISC slot, 2 SM slots, 4 GB Flash Memory default, 4 GB DRAM default
ISR4331/K9	ISR 4331 with 3 onboard GE, 2 NIM slots, 1 ISC slot, 1 SM slots, 4 GB Flash Memory default, 4 GB DRAM default
ISR4321/K9	ISR 4321 with 2 onboard GE, 2 NIM slots, 1 ISC slot, 4 GB Flash Memory default, 4 GB DRAM default

For additional product numbers, including the Cisco 4000 Family bundle offerings, please contact your local Cisco account representative. To place an order, visit the Cisco Ordering Home Page. To download software, visit the Cisco Software Center.

Integrated Services Router Migration Options

The Cisco ISR 4000 Family is included in the standard Cisco Technology Migration Program (TMP). Refer to http://www.cisco.com/go/tmp and contact your local Cisco account representative for program details.

Warranty Information

The Cisco ISR 4000 Series Integrated Services Routers have a 90-day limited liability warranty.

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Cisco SMARTnet® technical support for the Cisco ISR 4000 Family is available on a one-time or annual contract basis. Support options range from help-desk assistance to proactive, onsite consultation. All support contracts include:

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For More Information

For more information about the Cisco ISR 4000 Family, visit http://www.cisco.com/go/ISR4K or contact your local Cisco account representative.

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