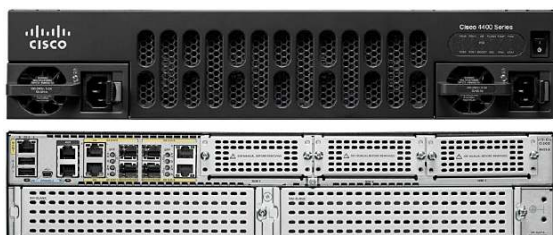# Cisco 4451-X Integrated Services Router

Cisco® Integrated Services Routers (ISRs) are built on 30 years of our innovation and product leadership.

Figure 1.   Cisco 4451-X Integrated Services Routers

The Cisco 4451-X Integrated Services Router revolutionizes the delivery of application-aware services in a branch-office environment. This new member of the Cisco ISR Family provide extensive Layer 7 services hosted internally to the branch office while maximizing operating expenses(OpEx) savings.

The Cisco 4451-X offers a multicore CPU architecture running modular Cisco IOS® XE Software that dynamically adapts to the changing needs of your branch-office environment. The separation of the control and data planes provides the ability to deliver application-aware network services while maintaining a stable platform and a high level of performance during periods of heavy network load. With the ability to integrate application-aware services and the ability to scale performance without a complete equipment upgrade, the Cisco 4451-X offers exceptional total cost of ownership (TCO) savings and network agility through the intelligent integration of market-leading security, unified communications, and application services.

Product Overview

The Cisco 4451-X offers encryption acceleration, voice- and video-capable architecture, application firewall, call processing, and embedded services. In addition, the platform supports a range of wired connectivity options such as T1/E1, T3/E3, and fiber Gigabit Ethernet. This platform offers superior performance and flexibility for network deployments across large enterprise offices.

Key Business Benefits

Cisco ISRs provide superior services integration and agility. Designed for scalability, the modular architecture of this platform enables you to evolve and adapt with your growing business needs. Table 1 lists the business benefits of the Cisco 4451-X.

Table 1.   Cisco 4451-X Business Benefits

Benefits	Description
Services integration	• The Cisco 4451-X Router offers service integration with voice, video, security, data, and embedded services. • The Cisco 4451-X provides the highest performance among the routers in the Cisco ISR portfolio, enabling you to maximize services integration and reducing overall capital expenditures (CapEx) and OpEx.
Services on demand	• The Cisco 4451-X industry-first internal services plane allows for remote installation of application-aware services without compromise. Applications run and are managed identically to their counterparts in dedicated appliances. • A single Cisco IOSXE Software Universal image is installed on each Cisco ISR. The Universal image contains all of

Benefits	Description
	the Cisco IOS XE Software technology sets, which you can activate with a software license. With the Universal image your business can quickly deploy advanced features without downloading a new Cisco IOS XE Software image. • The Cisco Unified Computing System™ (Cisco UCS®) E-Series modules allow you to reduce CapEx and deploy a variety of application services in an integrated general-purpose server.
High performance with integrated services	• The Cisco 4451-X enables deployment in high-speed WAN environments with concurrent services enabled up to 2Gbps. • The backplane architecture enables high-bandwidth module-to-module communication up to 10 Gbps without compromising router performance.
Network agility	• The Cisco 4451-X gives you the performance and services needed to accommodate the changes in the business environment brought about by the migration to cloud-based services. • Performance-on-demand licensing increases the router capacity without any hardware upgrades. • Dual integrated power supplies provide power redundancy and industry-leading power efficiency. • Modular interfaces offer increased bandwidth, a diversity of connection options, and network resiliency.
Investment protection	• The Cisco 4451-X maximizes investment protection by supporting a rich set of Cisco IOS XE Software features delivered in a single, universal image. • The Cisco 4451-X offers extensive growth possibilities as your network expands: ◦ The performance-on-demand licensing enables flexibility for future upgrades. ◦ Module density provides flexibility to add services as your business needs expand.

Platform Architecture and Modularity

The Cisco 4451-X is architected to meet the application demands of today's branch offices with design flexibility for future applications. The modular architecture is designed to support increasing bandwidth requirements, time-division multiplexing (TDM) connections, and fully integrated power distribution to modules supporting IEEE 802.3af Power over Ethernet (PoE) and 802.3at PoE Plus (PoE+). Table 2 lists the architectural features and benefits of the Cisco 4451-X.

Table 2. Architectural Features and Benefits of Cisco 4451-X

Architectural Features	Benefits
Modular platform	• The Cisco 4451-X is a modular platform with several types of module slots to add connectivity and services for varied branch-office network requirements. • The routers offer a breadth of LAN and WAN connectivity options through modules to accommodate field upgrades to future technologies without requiring platform replacement.
Processors	• The Cisco 4451-X is powered by high-performance multicore processors that can support the growing demands of high-speed WAN connections to the branch office while also running multiple concurrent services. • The Cisco 4451-X data plane uses an emulated Quantum Flow Processor (QFP) that delivers application-specific integrated circuit (ASIC)-like performance that does not degrade as services are added.
Embedded IP Security (IP sec) VPN hardware acceleration	• Embedded hardware encryption acceleration is enhanced to provide higher scalability, which, combined with an optional Cisco IOS XE Software Security license, enables WAN link security and VPN services.
Integrated Gigabit Ethernet ports	• The Cisco 4451-X provides four 10/100/1000 Ethernet ports for WAN or LAN. • All four 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. • You also have the option of enabling PoE on 2 out of the 4 ports. • 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 or802.3at-compliant PoE+) to optional integrated switch modules. • Redundant PoE conversion modules provide an additional layer of fault tolerance. • Optional PoE on two front Gigabit Ethernet interfaces provides power to external devices such as fourth-generation (4G) routers.
Optional integrated redundant power supply (RPS) and PoE boost	• Power redundancy is available by installing an optional integrated RPS, thereby decreasing network downtime and protecting the network from power failures. • Optional PoE boost mode increases total PoE capacity to 1000W.

Modularity Features and Benefits

The Cisco 4451-X provides significantly enhanced modular capabilities (refer to Table 3) while maintaining investment protection for customers.

A complete list of supported modules, including a list of supported SFPs for the Cisco 4451-X, is available at: http://www.cisco.com/en/US/products/ps10536/products_relevant_interfaces_and_modules.html.

Table 3.   Modularity Features and Benefits

Architectural Features	Benefits
Cisco Enhanced Services Module (SM-X)	• Each service-module slot offers high data-throughput capability up to 10Gbps toward the router processor and to other module slots. • Support for both single- and doublewide service modules provides flexibility in deployment options. • You can increase interface density with a carrier card that supports network interface modules in a service-module slot. • Service modules support online insertion and removal (OIR), reducing downtime required for new or replacement modules.
Cisco Network Interface Modules (NIMs)	• The Cisco NIM evolves the enhanced high-speed WAN interface card (EHWIC), increasing port density and module capability. • Three integrated NIM slots on the Cisco 4451-X allow for flexible configurations. • Each NIM slot offers high-data-throughput capability up to 2Gbps toward the router processor and to other module slots. • NIMs support OIR, reducing downtime required for new or replacement modules. • Special NIMs add support solid-state drives (SSDs) and hard-disk drives (HDDs).
Cisco Integrated Services Card (ISC) slot on motherboard	• ISC natively supports the new Cisco High-Density Packet Voice Digital Signal Processor Modules (PVDM4s), providing greater-density rich-media voice. • Each ISC slot connects back to the system architecture through a 2-Gbps link. • Future modules can be hosted on the ISC slot, improving system functions.
Flash memory support	• A single flash memory slot is available on the Cisco 4451-X to support high-speed storage densities upgradable to 32GB. • Two USB type A 2.0 ports are supported, providing secure token capabilities and convenient storage.
DRAM	• You can upgrade the default 4-GB control-plane memory to 16GB to provide additional scalability for control-plane features. • The default data-plane memory is 2 GB.

Cisco IOS XE Software

The Cisco 4451-X delivers innovative technologies running on industry-leading Cisco IOS XE Software. Cisco IOS XE Software is designed to provide modular packaging, feature velocity, and powerful resiliency. Developed for wide deployment in the world's most demanding enterprise, access, and service provider networks, Cisco IOS XE Software releases support a comprehensive portfolio of Cisco technologies. New innovations span multiple technology areas, including security, voice, high availability, IP Routing, IP Multicast, quality of service (QoS), IP Mobility, Multiprotocol Label Switching (MPLS), VPNs, and embedded management. For more information about Cisco IOS XE releases, please visit http://www.cisco.com/go/ios.

Cisco IOS Software Licensing and Packaging

A single Cisco IOS XE Universal image encompassing all functions is delivered with the platform. You can enable advanced features by 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 4451-X; you can activate the licenses 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 (AX): This license includes data and application performance features.
- Unified Communications: This license includes voice, video, and additional rich-media services.
- Security (SEC) or Security with No Payload Encryption (SEC-NPE): This license includes features for securing network infrastructure.

The Cisco 4451-X has a performance-on-demand license to double the base forwarding throughput offered, 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.

For additional information and details about Cisco IOS Software licensing and packaging on the Cisco 4451-X, please visit http://www.cisco.com/go/g2licensing.

Key Branch-Office Services

The industry-leading Cisco ISRs offer unprecedented levels of services integration. Designed to meet the requirements of the branch office, the Cisco 4451-X provides a complete solution with voice, video, security, mobility, and application services. Businesses enjoy the benefits by deploying a single device that meets all their needs, reducing CapEx and OpEx.

Trustworthy Systems Foundation

The Cisco 4451-X is designed to offer a higher level of product security and assurance through Cisco Secure Development Lifecycle (SDL) and Cisco Trust Anchor Technology (TAT) innovations. These initiatives increase security protection for customer networks, allowing customers to assure devices for greater control on policies and management. Cisco SDL is a combination of technology, processes, and policies to embed security in each aspect of the Cisco product development methodology. It provides a repeatable and measurable process designed to mitigate the risk of vulnerabilities and increase product resiliency. TAT encompasses numerous security initiatives based on incorporating a trust anchor module (TAM) that provides a secure area in the platform to both attest the genuineness of the product and provide immutable identity and secure storage for key management. Trust anchor secure boot helps validate the authenticity of Cisco software at boot-up by verifying that the digital certified software being used has not been maliciously altered. These foundational features are part of our ongoing commitment to design products with trust in mind and continued innovation to enhance resiliency in our customers' networks.

Unified Communications, Collaboration, and Voice-Gateway Services

The Cisco ISR is the foundation for collaboration in branch offices of any size and is a critical component of the Cisco video architecture (medianet) and enterprise unified communications solution. With embedded voice services and a wide range of telephony interfaces that will be supported, the Cisco 4451-X delivers maximum deployment flexibility for the distributed enterprise.

Unified communications is enabled through a rich signaling and media-processing infrastructure, including a variety of protocols, media interworking, signal and media security, transcoding, conferencing, and quality of service (QoS). The performance improvements introduced with the Cisco 4451-X help ensure that branch-office employees benefit from the same productivity advantages and wide breadth of services and applications as those enjoyed by the headquarters-based employees.

The Cisco 4451-X enables a full range of existing and emerging video services, with scaling improvement to support Cisco TelePresence® conferencing, security, and session control. Cisco Unified Border Element extends these capabilities for business-to-business telepresence communications.

The Cisco 4451-X supports the new Cisco High-Density Packet Voice Digital Signal Processor Module (PVDM4), which has been optimized for concurrent voice and video support. The PVDM4 modules support all voice-gateway functions of earlier generations of PVDMs, and add higher density and more processing power to support emerging rich-media applications. The Cisco 4451-X supports one onboard ISC slot supporting one PVDM4 module.

Cisco Unified Communications Manager Express and Survivable Remote Site Telephony

The Cisco ISRs inherently provide optional unified communications services within the Cisco IOS Software, delivering the advantage of server hardware reduction and lower energy costs at the branch office. Cisco Unified Communications Manager Express (CME) provides the broad range of IP private-branch-exchange (PBX) and key-system features integrated into the router for branch offices. Cisco Survivable Remote Site Telephony (SRST), also inherently available in Cisco IOS Software and an option on the Cisco 4451-X, helps ensure that branch-office employees have uninterrupted telephony services and features, even if the connection to a centralized Cisco Unified Communications Manager is disrupted.

Cisco Unified Border Element

The Cisco Unified Border Element capabilities supported on the Cisco 4451-X address the emerging requirements in an IP-centric interconnect for branch-office unified communications between enterprises and service provider networks. Cisco Unified Border Element provides intelligent border-element functions such as physical and logical ingress and egress demarcation points, signaling and media control, and consolidated security and management features. The Cisco 4451-X supports higher scale than previously provided on the ISRs.

Integrated Network Security for Data, Voice, Video, and Mobility

Security is essential to protect a business' intellectual property while also ensuring business continuity and providing the ability to extend the corporate workplace to employees who need anytime, anywhere access to company resources.

The Cisco IOS XE Security technology package for the Cisco 4451-X offers a wide array of security features such as advanced application inspection and control, firewall, and encryption architectures for enabling more scalable and manageable VPN networks. The Cisco 4451-X offers onboard hardware-based encryption acceleration to provide greater IP sec throughput with less overhead for the route processor when compared with software-based encryption solutions. Cisco ISRs offer a comprehensive and adaptable security solution for branch offices that includes features such as:

- Secure connectivity: Providing secure collaborative communications with Group Encrypted Transport VPN, Dynamic Multipoint VPN (DMVPN), Flex VPN, or Easy VPN
- Integrated threat control: Responding to sophisticated network attacks and threats using Cisco IOS XE Zone-Based Firewall
- Identity management: Intelligently protecting endpoints using technologies such as authentication, authorization, and accounting (AAA) and public key infrastructure (PKI)

The embedded Cisco ISR-CX (context-aware) firewall enforces differentiated policies based on the user, device, role, and application type. Based on the Cisco ASA-CX Series Adaptive Security Appliance, the Cisco ISR-CX provides parity within the Cisco firewall portfolio.

Detailed information about the security features and solutions supported on the Cisco 4451-X is available at http://www.cisco.com/go/routersecurity.

Application Services

As organizations continue to centralize and consolidate their branch-office IT infrastructure in an effort to reduce cost and complexity, they are challenged to provide adequate user experience, ensure continuous service availability, and deliver business-relevant applications when and where they are needed. To address these challenges, the Cisco 4451-X enables you to host Cisco, third-party, and custom applications on a portfolio of high-performance Cisco UCSE-Series modules that integrate into the router. The modules have their own processors, hard disks, network interfaces, and memory that operate independently of the host router resources, helping ensure maximum concurrent routing and application performance while reducing physical space requirements, lowering power consumption, and consolidating management.

Application Acceleration

The Cisco 4451-X transparently combines industry-leading security, Cisco IOS XE Software-based traffic control, and visibility with Cisco application-acceleration solutions.

Cisco IOS XE Software features such as Network-Based Application Recognition (NBAR), IP service-level agreement (IP SLA), and NetFlow provide visibility and monitoring of traffic patterns and application performance. Software features such as QoS, access control lists (ACLs), and Performance Routing intelligently control the traffic to maximize the quality of the user experience and employee productivity. You can further enhance user experience by adding Cisco Wide Area Application Services (WAAS) to securely provide more advanced WAN optimization techniques such as TCP optimization, caching, compression, and application acceleration.

The Cisco 4451-X with embedded WAAS offers full feature parity with Cisco WAAS Appliances, providing optimal performance for applications delivered from a central data center to branch-office users. The solution allows you to consolidate costly server, storage, and backup infrastructure into data centers while maintaining LAN-like service levels for remote users.

Managing Your Integrated Services Routers

Network management applications are instrumental in lowering OpEx while improving network availability by simplifying and automating many of the day-to-day tasks associated with managing an end-to-end network. Day-one device support provides immediate manageability support for the ISR, enabling quick and easy deployment, monitoring, and troubleshooting from Cisco and third-party applications.

Organizations rely on Cisco, third-party, and in-house-developed network management applications to achieve their OpEx and productivity goals. Underpinning those applications are the embedded management features available in every ISR. The Cisco 4451-X continues a tradition of broad and deep manageability features within the device. Features such as IP SLA, Embedded Event Manager (EEM), and NetFlow allow you to know the status of your network at all times. These features, along with Simple Network Management Protocol (SNMP) and syslog support, enable your organization's management applications.

The Cisco 4451-X also includes support for the One Platform Kit (Cisco onePK) set of universal application programming interfaces (APIs). Cisco onePK allows application developers to easily integrate the network with their applications.

Refer to Tables 4, 5, and 6 for an overview of Cisco IOS XE Software features, network management, and manageability support on the Cisco 4451-X.

Table 4.   Cisco 4451-X with Cisco IOS XE Software Feature and Protocol High-Level Support

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), 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.

For more details about Cisco IOS XE Software features, refer to http://www.cisco.com/go/fn.

Table 5.   Overview of Embedded Management Features Available with Cisco IOS XE Software

Feature	Description of Feature Supported by Cisco Integrated Services Routers
EEM	• Cisco IOS Embedded Event Manager (EEM) is a distributed and customized approach to event detection and recovery offered directly in a Cisco IOS Software device. It 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)	• Cisco IOS XE IP SLAs enable you to assure performance of new business-critical IP applications as well as IP services that use data, voice, and video in an IP network.
SNMP, Remote Monitoring (RMON), syslog, and NetFlow	• The Cisco 4451-X also supports SNMP, RMON, syslog, NetFlow, and IP Flow Information Export (IPFIX) in addition to the embedded management features mentioned.
Cisco onePK	• Cisco onePK allows application developers to easily integrate the network with their applications.

The Cisco network management applications listed in Table 6 are standalone products that you can purchase or download to manage your Cisco network devices. The applications are built specifically for the different operational phases; you can select the ones that best fit your needs.

Table 6.   Network Management Solutions

Operational Phase	Application	Description
Device staging and configuration	Cisco Configuration Professional	• Cisco Configuration Professional is 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.
Networkwide deployment, configuration, monitoring, and troubleshooting	Cisco Prime™ Infrastructure	• 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. • It 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	• Cisco Configuration Engine is 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	• Cisco Prime Security Manager is the management tool for configuring and managing context-aware security. The application supports both single- and multidevice manager form factors. • Cisco Prime Security Manager provides the ability to write and enforce the granular

Operational Phase	Application	Description
		context-aware security policies.
Cisco WAAS management	Cisco WAAS Central Manager	• The Cisco WAAS Central Manager is the management tool for the WAAS integrated service. It provides a centralized mechanism for configuring WAAS features, reporting, and monitoring.

Summary

Businesses need more intelligent branch-office solutions as they strive to lower the TCO for running their networks and increase their overall employee productivity with more centralized and collaborative network applications. The Cisco 4451-X offers these solutions by providing enhanced performance and increased modular density to support multiple concurrent services. The Cisco 4451-X is designed to consolidate the functions of many separate devices into a single system that you can manage remotely. Table 7 lists the specifications of the Cisco 4451-X ISR.

Table 7. Specifications of Cisco 4451-X Integrated Services Routers

Services and Slot Density	Cisco 4451-X
Total onboard WAN or LAN 10/100/1000 ports	4
RJ-45-based ports	4
SFP-based ports	4
Enhanced service-module slots	2
Doublewide service-module slots	1 (assumes no singlewide SM-X modules installed)
NIM slots	3
OIR	Yes
Onboard ISC slot	1
Default memory double-data-rate 2 (DDR2) error-correction-code (ECC) DRAM (data plane)	2 GB
Maximum memory DDR2 ECC DRAM (data plane)	2 GB
Default memory DDR2 ECC DRAM (control plane)	4 GB
Maximum memory DDR2 ECC DRAM (control plane)	16 GB
Default flash memory	8 GB
Maximum flash memory	32 GB
External USB 2.0 slots (type A)	2
USB console port (type B) (up to 115.2 kbps)	1
Serial console port (up to 115.2 kbps)	1
Serial auxiliary port (up to 115.2 kbps)	1
Power-supply options	Internal: AC and PoE
Redundant power supply	Internal: AC and PoE
Power Specifications	
AC input voltage	100 to 240 VAC autoranging
AC input frequency	47 to 63 Hz
AC input current range, AC power supply (maximum)	7.1 to 3.0A
AC input surge current	<50A
Typical power (no modules) (watts)	158
Maximum power with AC power supply (watts)	450 (no PoE)
Maximum power with PoE power supply (platform only) (watts)	1000 with PoE redundant 1450 with PoE boost no redundancy
Maximum endpoint PoE power available from PoE power supply (watts)	500 W with optional redundancy

Services and Slot Density	Cisco 4451-X
Maximum endpoint PoE power capacity with PoE boost (watts)	950 W no redundancy
Dimensions (H x W x D)	3.5 x 17.25 x 18.5 in. (88.9 x 438.15 x 469.9 mm) Shipping box size: 9.75 x 22.25 x 26 in. (24.76 x 56.51 x 66.04 mm)
Rack height	2 rack units (2RU)
Rack-mount 19in. (48.3 cm) EIA	Included
Rack-mount 23in. (58.4 cm) EIA	Optional
Wall-mount	No
Weight with 1, 450-WAC power supply (no modules)	28.8 lb (13.1 kg)
Weight with 1 1,000-WAC power supply+ 1 PoE power module (no other modules)	30.5 lb (13.9 kg)
Typical weight (fully loaded with modules)	42.7 lb (19.4 kg)
Airflow	I/O side to bezel side
Environmental Specifications **Operating Conditions**	
Temperature (altitude 0-10000 ft) (altitude 0-3000m)	32 to 104ºF (0 to 40ºC)
Temperature (altitude 10000-15000ft) (altitude 3000m-4600m)	32 to 95ºF (0 to 35ºC)
Relative humidity	5 to 85%
Short-term humidity	5% to 90%, not to exceed 0.024 kg water/kg of dry air
Acoustic: Sound pressure (typical/maximum)	50.6/73.1
Acoustic: Sound power (typical/maximum)	58.2/78.8
Nonoperating Conditions	
Temperature	-40 to 158ºF (-40 to 70ºC)
Relative humidity	5 to 95%
Altitude	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
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

Services and Slot Density	Cisco 4451-X
	KN22,KN24
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

Ordering Information

The Cisco 4451-X is orderable and shipping. For more information about how to order it, please visit the ISR Ordering Guide. To place an order, visit the Cisco Ordering Home Page and refer to Table 8.

For additional product numbers, including the Cisco 4451-X bundle offerings, please check the Cisco 4400 Series Integrated Services Router Price List or contact your local Cisco account representative. To place an order, visit the Cisco Ordering Home Page. To download software, visit the Cisco Software Center.

Table 8.   Cisco 4451-X Ordering Information

Product Name	Product Description
ISR4451-X/K9	• ISR4451 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)

Integrated Services Router Migration Options

The Cisco 4451-X 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 4451-X Integrated Services Routers have a 90-day limited liability warranty.

Cisco and Partner Services for the Branch Office

Services from Cisco and our certified partners can help you transform the branch-office experience and accelerate business innovation and growth in the Borderless Network. We have the depth and breadth of expertise to create a clear, replicable, optimized branch-office footprint across technologies. Planning and design services align technology with business goals and can increase the accuracy, speed, and efficiency of deployment. Technical services can help you improve operational efficiency, save money, and mitigate risk. Optimization services are designed to continuously improve performance and help your team succeed with new technologies. For more information, please visit http://www.cisco.com/go/services.

Cisco SMARTnet® technical support for the Cisco 4451-X 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:

- Major Cisco IOS Software updates in protocol, security, bandwidth, and feature improvements
- Full access rights to Cisco.com technical libraries for technical assistance, electronic commerce, and product information
- Access 24 hours a day to the industry's largest dedicated technical support staff

For More Information

For more information about the Cisco 4451-X, visit http://www.cisco.com/go/isr4451 or contact your local Cisco account representative.

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