

Faculty of computer science

CS322/CS216

Network Project:

Design of Data and Surveillance

For building G

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**Network Systems Laboratory**

Network Systems Lab (NSLab) conducts research and education in the area of design, analysis, and management of next generation networks and services. In particular, our main research focus is making it easy to develop and manage key societal Network Systems that meet their objectives. Classic examples include high performance, high reliability, and low-power.

# What is a Data Center?

At its simplest, a data center is a physical facility that organizations use to house their critical applications and data. A data center's design is based on a network of computing and storage resources that enable the delivery of shared applications and data.

### **What defines a modern data center?**

Modern data centers are very different than they were just a short time ago. Infrastructure has shifted from traditional on-premises physical servers to virtualized infrastructure that supports applications and workloads across pools of physical infrastructure and into a multicloud environment.

In this era, the modern data center is wherever its data and applications are. It stretches across multiple public and private clouds to the edge of the network via mobile devices and embedded computing. In this constantly shifting environment, the data center must reflect the intentions of users and applications.

### **Why are data centers important to business?**

In the world of enterprise IT, data centers are designed to support business applications and activities that include:

* Email and file sharing
* Productivity applications
* Customer relationship management (CRM) and enterprise resource planning (ERP)
* Big data, artificial intelligence, and machine learning
* Communications and collaboration services

### **What are the core components of a data center?**

Data center design includes routers, switches, firewalls, storage systems, servers, and application delivery controllers. Because these components store and manage business-critical data and applications, [data center security](https://www.cisco.com/c/en/us/solutions/security/secure-data-center-solution/index.html) is critical in data center design. Together, they provide:

Network infrastructure. This connects servers (physical and virtualized), data center services, storage, and external connectivity to end-user locations.

Storage infrastructure. Data is the fuel of the modern data center. Storage systems are used to hold this valuable commodity.

Computing resources. Applications are the engines of a data center. These servers provide the processing, memory, local storage, and network connectivity that drive applications.

### **How do data centers operate?**

Data center services are typically deployed to protect the performance and integrity of the core data center components.

Network security appliances. These include firewall and intrusion protection to safeguard the data center.

Application delivery assurance. To maintain application performance, these mechanisms provide application resiliency and availability via automatic failover and load balancing.

### **What is in a data center facility?**

Data center components require significant infrastructure to support the center's hardware and software. These include power subsystems, uninterruptible power supplies (UPS), ventilation, cooling systems, fire suppression, backup generators, and connections to external networks.

### **What are the standards for data center infrastructure?**

The most widely adopted standard for data center design and data center infrastructure is ANSI/TIA-942. It includes standards for ANSI/TIA-942-ready certification, which ensures compliance with one of four categories of data center tiers rated for levels of redundancy and fault tolerance.

Tier 1: Basic site infrastructure. A Tier 1 data center offers limited protection against physical events. It has single-capacity components and a single, nonredundant distribution path.

Tier 2: Redundant-capacity component site infrastructure. This data center offers improved protection against physical events. It has redundant-capacity components and a single, nonredundant distribution path.

Tier 3: Concurrently maintainable site infrastructure. This data center protects against virtually all physical events, providing redundant- capacity components and multiple independent distribution paths. Each component can be removed or replaced without disrupting services to end users.

Tier 4: Fault-tolerant site infrastructure. This data center provides the highest levels of fault tolerance and redundancy. Redundant-capacity components and multiple independent distribution paths enable concurrent maintainability and one fault anywhere in the installation without causing downtime

## **Types of data centers**

Many types of data centers and service models are available. Their classification depends on whether they are owned by one or many organizations, how they fit (if they fit) into the topology of other data centers, what technologies they use for computing and storage, and even their energy efficiency. There are four main types of data centers:

### **Enterprise data centers**

These are built, owned, and operated by companies and are optimized for their end users. Most often they are housed on the corporate campus.

### **Managed services data centers**

These data centers are managed by a third party (or a managed services provider) on behalf of a company. The company leases the equipment and infrastructure instead of buying it.

### **Colocation data centers**

In colocation ("colo") data centers, a company rents space within a data center owned by others and located off company premises. The colocation data center hosts the infrastructure--building, cooling, bandwidth, security, etc. while the company provides and manages the components, including servers, storage, and firewalls.

### **Cloud data centers**

In this off-premises form of data center, data and applications are hosted by a cloud services provider such as Amazon Web Services (AWS), Microsoft (Azure), or IBM Cloud.

**How to choose the right type of firewall**

Choosing the right type of firewall means answering questions about what the firewall is intended to do, how it will be used, what it is intended to protect and any number of general questions about the infrastructure it is intended to protect. The right firewall for different organizations will almost invariably differ from one to another, as each private network is unique and has its own unique requirements.

### How do the different types of firewalls work?

Firewalls are inserted inline across a network connection and look at all the traffic passing through that point. As they do so, they are tasked with telling which network protocol traffic benign and which packets are part of an attack.

A computer program that can generally look at a string of computer instructions and determine its intent runs abruptly into a fundamental thesis of computer science: No computer program can perfectly predict the outcome of another computer program without running it to see what it does. By extension, it's not possible to generally look at network traffic and discern its intent.

### Application-level gateway

This kind of device -- technically a proxy and sometimes referred to as a [*proxy firewall*](https://searchsecurity.techtarget.com/definition/proxy-firewall) -- combines some of the attributes of packet filtering firewalls with those of circuit-level gateways. They filter packets not only according to the service for which they are intended -- as specified by the destination port -- but also by certain other characteristics, such as the HTTP request string.

While gateways that filter at the application layer provide considerable data security, they can dramatically affect network performance.

### Next-generation firewall

A typical [NGFW](https://searchsecurity.techtarget.com/feature/Introduction-to-next-generation-firewalls-in-the-enterprise) combines packet inspection with stateful inspection and also includes some variety of [deep packet inspection](https://searchnetworking.techtarget.com/definition/deep-packet-inspection-DPI), as well as other network security systems, such as intrusion detection/prevention, malware filtering and antivirus.

While packet inspection in traditional firewalls looks exclusively at the protocol header of the packet, deep packet inspection looks at the actual data the packet is carrying. A deep packet inspection firewall tracks the progress of a web browsing session and is capable of noticing whether a packet payload, when assembled with other packets in an HTTP server reply, constitutes a legitimate HTML formatted response.

### Projectors are commonly used in classrooms, corporate meetings, houses of worship, concerts, movie and home theaters. It is helpful to have an understanding of the different types of projectors, their intended uses and the type of lens needed to determine what type of projector is best for a given situation.

Types

There are two common types of projectors: DLP (digital light processing), and LCD (liquid crystal display). In the early days of projectors, CRT (cathode ray tube) projectors were commonly used. They utilized three tubes, one for each of the primary colors. Due to their large size, low light output and the frequent need to converge and align the images projected from each of the three tubes, they are no longer commonly used.

LCD

LCD projectors work by utilizing polarized mirrors that pass and reflect only certain colors of light. This causes each channel of red, green and blue to be separated and later re-converged via a prism after passing through an LCD panel that controls the intensity and saturation of each color.

DLP

DLP projectors can be classified as one-chip or three-chip. Each chip houses millions of mirrors that reflect light thousands of times each second. One-chip DLP projectors can produce more than 16 million colors while three-chip models can produce more than 35 trillion colors. This allows DLP projectors to reproduce more natural and lifelike images. The closeness of each mirror within a chip makes it difficult to see any spaces separating the pixels and in turn creates a more fluid and crisper image compared to LCD technology.

Brightness

Brightness of the projector is rated in lumens. The higher the lumen value, the higher the potential brightness of the image. Projector usage and surroundings determine the type and brightness of projector needed. When used in a small room projecting on a small screen, an LCD or one-chip [DLP projector](http://i.viglink.com/?key=535fb381c276aba2df16c56f4cdce13c&insertId=0d0cc4b0ecdc961a&type=S&exp=60%3ACI1C55A%3A4&libId=ka8l5szu01021li9000DAbpzldfh8&loc=https%3A%2F%2Fitstillworks.com%2Fabout-5367165-different-kinds-projectors.html&v=1&iid=0d0cc4b0ecdc961a&opt=true&out=http%3A%2F%2Fwww.ebay.com%2Fsch%2FConsumer-Electronics-%2F293%2Fi.html%3F_nkw%3Ddlp%2Bprojector&ref=https%3A%2F%2Fwww.google.com%2F&title=What%20Are%20the%20Different%20Kinds%20of%20Projectors%3F&txt=%3Cspan%3EDLP%20%3C%2Fspan%3E%3Cspan%3Eprojector%3C%2Fspan%3E) with a lumen rating of 1,500 to 3,000 may be used with appealing results. In large venues using larger screens or when ambient light may affect the image, a three-chip DLP projector with a lumen rating of 10,000 to 28,000 should be used.

* **Non-PoE: FS S3900-48T4S**

As a member of S3900 series family, S3900-48T4S is a 48 100/1000Base-T ports Gigabit managed switch with 4 10G SFP+ uplinks that is designed for SMB, enterprise, and campus networks. With rich enterprise-class and managed features, this [48 port switch](https://www.fs.com/products/72946.html) can be easily configured and monitored through a web-based graphical user interface. It has two separate supplies: single power and dual power versions which can be used as alternatives and selected in accordance with different requirements. In general, the S3900-48T4S 48 port switch is the ideal L2+ access switch solution with 10GbE uplink for converged data, video and voice networking.

Nowadays, high density port switch is popular with small and middle-sized business data centers. What is more, 48 port switch price is becoming more acceptable than before. This article focuses on the recommendation of 4 types of 48 port switch for different requirements: managed non-PoE switch, managed PoE switch, unmanaged non-PoE switch and unmanaged PoE switch. Each kind of 48 port switch has its own characteristics and functions when applied to different situations and demands. For 48 port [gigabit switch](https://www.fs.com/c/1g-switches-3255) or 48 port PoE switch, FS.COM could always be a good choice.

## What is a Network Switch?

A network switch is a computer networking device that keeps your computer users connected to each other and/or the internet. From printers, to computers, to game consoles and DVD drives, this system allows the smooth flow of data transfer to the designated device. Streaming videos from a different device and downloading pictures while you are in the other room, are just some examples of the function of this switch.

There are different types of switches made available. Depending on the number of devices you have and the number of people using the network, you have to choose the right kind of switch that fits your space.

Types of Network Switches

### LAN Switch or Active Hub

Also known as the local area network or Ethernet switch, this device is used to connect points on a company’s internal LAN. It blocks the overlap of data packets that run through a network by allocating the bandwidth economically. When we say bandwidth, it refers to the amount of data that can be carried from one point to the other under a given period of time. With a LAN switch, it reduces the network traffic by delivering the data only to its intended recipient. The important bandwidth would first be delivered before the subsequent ones.

### Unmanaged Network Switches

Mostly used in home networks and small companies or businesses, this device allows other devices on the network to connect with each other; it could be from one computer to the other, or a computer connected to a printing device. As what the name suggests, this type of device does not need to be watched constantly and it is the easiest and simplest installation, because of its small cable connections.

### Managed Switches

Unlike the unmanaged network switch, this device is customizable; because of this feature, you can enhance the functionality of a certain network. This device has two types – Smart switches and Enterprise switches.

Smart switches have limited features but provide a web interface and accept configurations of basic settings. They are perfect for fast and constant LANs which support gigabit data transfer and allocations.

Enterprise switches have a wide range of management features and the capability to fix, copy, and transform and display network configurations. They are usually found in large companies which contain large numbers of connections, nodes, switches, and ports. Having more features than the smart switches, Enterprise switches are usually more expensive.

Routers

You may be more familiar with this device than any other switches that were described. A router is an electronic device that sends data along networks. It is usually connected to LANs or WANs and is capable of connecting more than two networks.

#### Inkjet

[Inkjet printers](https://www.printerland.co.uk/printers/inkjet) are one of the most common types of printer used in both professional and domestic settings. Developed in the 1950s, inkjet printing technology is still hugely popular today due to its numerous advantages and minimal drawbacks.

Advantages:  
● Capable of producing photo-realistic prints  
● Practically no warm-up time  
● Small footprint

Disadvantages:  
● High running costs (Cost per page)  
● Slow print speeds  
● Sometimes produce erroneous empty cartridge warnings  
● Prone to clogging  
● Wet prints

**Low-Cost Inkjet Printers**

Combining the high-quality print capabilities of inkjet technology with lower cost-per page functionality: low-cost inkjet printers are well-suited to professional and domestic users working on a budget.

Advantages:  
● Lower cost-per-page production  
● Quick warm-up time  
● Capable of producing fine, smooth, photo-realistic prints

Disadvantages:  
● Potentially wet prints

### IP Cameras Connect to the Network

All the cameras connect to the network in this type of system.

All users can view the video on their computers or mobile devices. The video is stored in the computer that uses video management recording software, or in the Network Video Recorder (NVR).

When you would like a very simple system installation that uses your existing network connections, you can use one of our packages.  For example, one of the IP camera packages includes 4 IP cameras.  When you have different objectives for each camera area, it is best to select a custom system that includes the right camera for each area. Don’t hesitate to contact us for advice about the right camera system for you.

Security room and basement floor

**Servers are:**

Servers are the foundation of numerous organizations, putting away delicate information that is basic for activities. System security will in general spotlight on programming and passwords, yet physical security is a basic segment. Play it safe to protect your servers and forestall burglary and altering.

**How can we secure our servers?**

Your servers ought to be put away in a bolted room where physical access is controlled and observed. Servers are costly and should be maneuvered carefully. Utilize particular lifts to move servers to diminish the danger of harm. Limit access to the server space to few people whose obligations expect them to approach. What's more, have a logbook in the space to record who has been in the room and the motivation behind why. This will empower you to all the more effectively distinguish the individual dependable if a server is messed with, harmed, or taken.

**Firewalls and what it makes for servers**

To forestall further harm to your system hardware by rouge representatives, sellers, or others who should not approach your IT gear, it is ideal to store your servers, firewalls, switches, and system boards in a bolted rack. This brings down the chance of a physical assault or somebody connecting a non-business gadget to take data from your server.

**Another type to get our network secured**

Screen who gets to the server room. Allocate workers identifications or use biometric recognizable proof to record the personalities of individuals who get to the server room and when they enter and leave. Track this information and screen

it to search for individuals obtaining entrance on occasion outside ordinary business hours.

Use observation cameras to record who gets to your server room. Identifications and ID cards can be taken, so you ought to have a visual record of the substance of any individual who goes into your server room. Reconnaissance cameras inside the room can let you see what is done while an individual is in the room.

**Therefore, we will build our security system and basement floor as**

.6 pcs connecting together at LAN and this LAN is connecting at 48 ports

.Then it is connected to the basement switch.

.There is two cables comes out from the basement switch each cable connected to a router then the router .connected to a smaller switch with the firewall .Two firewalls connected together to the cloud at the end.

**Floor (1) and (2)**

**Surveillance Cameras** is the checking of conduct, exercises, or data to impact, overseeing or coordinating. This can incorporate perception from a separation by methods for electronic hardware, for example, shut circuit TV (CCTV), or block attempt of electronically transmitted data, for example, Internet traffic. It can likewise incorporate basic specialized strategies, for example, human knowledge gathering and postal capture.

**FTP server**:A FTP server needs a TCP/IP organize for working and is subject to utilization of devoted servers with at least one FTP customers. To guarantee that associations can be built up consistently from the customers, a FTP server is normally turned on.

**Database server**: is the term used to allude to the back-end arrangement of a database application utilizing customer/server design. The back end, some of the time called a database server, performs assignments, for example, information investigation, stockpiling, information control, documenting, and other non-client explicit undertakings.

**Management server**: is ordinarily a Windows box that ■ Controls producing, putting away, and introducing of all strategies an administration server can oversee well over twelve requirement focuses. Every single one of these may have a different arrangement

**A print server, or printer server** is a gadget that associates printers to customer PCs over a system. It acknowledges print employments from the PCs and sends the occupations to the fitting printers, lining the employments locally to oblige the way that work may show up more rapidly than the printer can really deal with

**Therefore, we will build our second floor as**

The second floor will have

A central switch that connected to a smaller 48 port switch it division the floor at 2 servers and every server is connecting to web server, ftp server, database server, directory server, management server and print server

Every lab is connecting to second floor switch and contains 20 pcs, 2 printers, scanner and switch that connecting together and there is a main pc with scanner and printer so it will have access on the other devices and this main pc is mainly using by the instructor.

***Bill of Material (BOM)***

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| S. N | Item | Description | Unit | Qty |
|  | CAT6 A UTP Cable |  | 1442 | 1400+21500+1000 |
|  | RJ45 Face Plate |  |  | 200 |
|  | Drop Cable (PC) |  |  | 1400 |
|  | Patch Cord (panel) |  |  | 44 |

**Trunk**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Ducts |  |  | 43 |

**Active elements: Switches, Routers, Security, ...**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Access/Edge Switch |  |  | 40 =>48ports  2=>24ports |
|  | Distribution Switch |  |  | 3 =>24ports |
|  | Backbone Switch |  |  | 1=>24 ports |
|  | Router |  |  | 2=3ports |
|  | Modem |  |  | 2 |
|  | Fire wall |  |  | 2 |

**Connectivity**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Internet connectivity |  |  | 6 wireless access points |

**Data sheets**

# Cisco Catalyst 2960-48PST-S Switch

The Cisco® Catalyst® 2960-Plus Series Switches are fixed-configuration Fast Ethernet switches (Figure 1) that provide enterprise-class Layer 2 switching for branch offices, conventional workspaces, and infrastructure applications. They enable reliable and secure operations with a lower total cost of ownership through a range of Cisco IOS® software features, including Cisco Catalyst Smart Operations.

**Figure 1.**Cisco Catalyst 2960-Plus Series Switches

[](https://www.cisco.com/c/dam/en/us/products/collateral/switches/catalyst-2960-plus-series-switches/data_sheet_c78-728003.doc/_jcr_content/renditions/data_sheet_c78-728003-1.jpg)

Product Highlights

Cisco Catalyst 2960-Plus switches feature:

• 24 or 48 Fast Ethernet ports

• Small Form-Factor Pluggable (SFP) and 1000BASE-T Gigabit Ethernet uplinks

• IEEE 802.3af-compliant Power over Ethernet (PoE)

• LAN Base or LAN Lite Cisco IOS® Software feature set

• Smart Operations tools that simplify deployment and reduce the cost of network administration

• Cisco Energy Wise technology to manage energy consumed by connected devices

• An enhanced limited lifetime hardware warranty (E-LLW), providing next-business-day replacement

Applications and Benefits

The Cisco Catalyst 2960-Plus Series provides cost-effective, enterprise-class Ethernet switching for:

• Branch offices, remote sites, and retail locations

• Conventional desktop workspaces

• Building infrastructure, physical security, and other nontraditional access applications

Benefits of the 2960-Plus include:

• Robust quality of service (QoS) that prioritizes voice and critical business applications

• Flexible security features that can limit access to the network and mitigate threats

• Tools that reduce total cost of ownership through simplified operations and automation

Switch Configurations

Table 1 shows Cisco Catalyst 2960-Plus Series configurations.

**Table 1.**Cisco Catalyst 2960-Plus Series Configurations

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Model** | **10/100 Ethernet Interfaces** | **Uplink Interfaces** | **Cisco IOS Software Feature Set** | **Available PoE Power** |
| Cisco Catalyst 2960-Plus 48PST-L | 48 | 2 SFP and 2 1000BASE-T | LAN Base | 370W |
| Cisco Catalyst 2960-Plus 24PC-L | 24 | 2 (SFP or 1000BASE-T) | LAN Base | 370W |
| Cisco Catalyst 2960-Plus 24LC-L | 24 | 2 (SFP or 1000BASE-T) | LAN Base | 123W |
| Cisco Catalyst 2960-Plus 48TC-L | 48 | 2 (SFP or 1000BASE-T) | LAN Base | - |
| Cisco Catalyst 2960-Plus 24TC-L | 24 | 2 (SFP or 1000BASE-T) | LAN Base | - |
| Cisco Catalyst 2960-Plus 48PST-S | 48 | 2 SFP and 2 1000BASE-T | LAN Lite | 370W |
| Cisco Catalyst 2960-Plus 24PC-S | 24 | 2 (SFP or 1000BASE-T) | LAN Lite | 370W |
| Cisco Catalyst 2960-Plus 24LC-S | 24 | 2 (SFP or 1000BASE-T) | LAN Lite | 123W |
| Cisco Catalyst 2960-Plus 48TC-S | 48 | 2 (SFP or 1000BASE-T) | LAN Lite | - |
| Cisco Catalyst 2960-Plus 24TC-S | 24 | 2 (SFP or 1000BASE-T) | LAN Lite | - |

Robust Security

The Cisco Catalyst 2960-Plus Series Switches provide a range of security features to limit access to the network and mitigate threats, including:

• Features to control access to the network, including Flexible Authentication, 802.1x Monitor Mode, and RADIUS Change of Authorization

• Threat Defense features including Port Security, Dynamic ARP Inspection, and IP Source Guard

• Private VLAN Edge to provide isolation between switch ports

For more information about Cisco security solutions, visit [cisco.com/go/trustsec](https://www.cisco.com/go/trustsec).

Enterprise-Class Quality of Service

The Cisco 2960-Plus Series Switches offer intelligent traffic management that keeps everything flowing smoothly. Flexible mechanisms for marking, classification, and scheduling deliver superior performance for data, voice, and video traffic, all at wire speed. Primary QoS features include:

• Four egress queues per port and strict priority queuing so that the highest-priority packets are serviced ahead of all other traffic

• Shaped Round Robin (SRR) scheduling and Weighted Tail Drop (WTD) congestion avoidance

• Flow-based rate limiting and up to 64 aggregate or individual policers per port

• 802.1p class of service (CoS) and differentiated services code point (DSCP) field classification, with marking and reclassification on a per-packet basis by source and destination IP address, MAC address, or Layer 4 TCP/UDP port number

Cisco Catalyst Smart Operations

Cisco Catalyst Smart Operations is a comprehensive set of capabilities that simplify LAN planning, deployment, monitoring, and troubleshooting. Deploying Smart Operations tools reduces the time and effort required to operate the network and lowers the total cost of ownership (TCO).

• **Cisco Smart Install** enables zero-touch deployment by providing automated Cisco IOS Software image installation and configuration when new switches are connected to the network.

• **Cisco Auto Smart ports** enables automatic configuration of switch ports as devices to connect to the switch, with settings optimized for the device type.

• **Cisco Smart Troubleshooting** is an extensive array of diagnostic commands and system health checks within the switch, including Smart Call Home.

For more information about Cisco Catalyst Smart Operations, visit [cisco.com/go/smartoperations](https://www.cisco.com/go/smartoperations).

Cisco Energy Wise

Cisco Energy Wise ™ empowers IT teams to measure and manage the power consumed by devices connected to the network, providing measurable energy savings and reduced greenhouse gas emissions. Energy Wise policies can be used to control the power consumed by PoE-powered endpoints, desktop and data-center IT equipment, and a wide range of building infrastructure. Energy Wise technology is included on all Cisco Catalyst 2960-Plus Series Switches.

For more information about Cisco Energy Wise, visit [cisco.com/go/energywise](https://www.cisco.com/go/energywise).

Power over Ethernet

Cisco Catalyst 2960-Plus switches support IEEE 802.3af Power over Ethernet (PoE) to deliver lower total cost of ownership for deployments that incorporate Cisco IP phones, Cisco Aironet ® wireless access points, or other standards-compliant PoE end devices. PoE removes the need to supply wall power to PoE-enabled devices and eliminates the cost of adding electrical cabling and circuits that would otherwise be necessary for IP phone and WLAN deployments. [Table 2](https://www.cisco.com/c/en/us/products/collateral/switches/catalyst-2960-plus-series-switches/data_sheet_c78-728003.html#wp9001056) shows the total PoE power available with each 2960-Plus model.

**Table 2.**Switch PoE Power Capacity

|  |  |  |
| --- | --- | --- |
| **Switch Model** | **Maximum Number of PoE (IEEE 802.3af) Ports**\* | **Available PoE Power** |
| Cisco Catalyst 2960-Plus 48PST-L | 24 ports up to 15.4W | 370W |
| Cisco Catalyst 2960-Plus 24PC-L | 24 ports up to 15.4W | 370W |
| Cisco Catalyst 2960-Plus 24LC-L | 8 ports up to 15.4W | 123W |
| Cisco Catalyst 2960-Plus 48PST-S | 24 ports up to 15.4W | 370W |
| Cisco Catalyst 2960-Plus 24PC-S | 24 ports up to 15.4W | 370W |
| Cisco Catalyst 2960-Plus 24LC-S | 8 ports up to 15.4W | 123W |

\* Intelligent power management allows flexible power allocation across all ports.

Network Management

The Cisco Catalyst 2960-Plus Series Switches offer a superior CLI for detailed configuration and administration. 2960-Plus switches are also supported in the full range of Cisco network management solutions.

**Cisco Prime Infrastructure**

Cisco Prime ™ network management solutions provide comprehensive network lifecycle management. Cisco Prime Infrastructure provides an extensive library of easy-to-use features to automate the initial and day-to-day management of your Cisco network. Cisco Prime integrates hardware and software platform expertise and operational experience into a powerful set of workflow-driven configuration, monitoring, troubleshooting, reporting, and administrative tools.

For detailed information about Cisco Prime, visit [cisco.com/go/prime](https://www.cisco.com/go/prime).

**Cisco Network Assistant**

A PC-based network management application designed for small and medium-sized business (SMB) networks with up to 250 users, Cisco Network Assistant offers centralized network management and configuration capabilities. This application also features an intuitive GUI where users can easily apply common services across Cisco switches, routers, and access points.

For detailed information about Cisco Network Assistant, visit [cisco.com/go/cna](https://www.cisco.com/go/cna).

Cisco IOS Software

Cisco Catalyst 2960-Plus Series Switches are available with the LAN Base and LAN Lite feature sets. LAN Lite models provide reduced functionality and scalability for small deployments with basic requirements.

Note that each switch model is tied to a specific feature level; LAN Lite models cannot be upgraded to the LAN Base feature set.

For more information about the features included in the LAN Base and LAN Lite feature sets, refer to Cisco Feature Navigator: [http://tools.cisco.com/ITDIT/CFN](https://tools.cisco.com/ITDIT/CFN).

Technical Specifications

Tables 3 through 10 list information about hardware, performance, forwarding performance, mechanical and environmental specifications, connectors and interfaces, management and standards support, voltage and power ratings, and power consumption, respectively.

**Table 3.**Cisco Catalyst 2960-Plus Series Hardware

|  |  |
| --- | --- |
| **Hardware Specifications** | |
| Flash memory | 64 MB |
| DRAM | 128 MB |

**Table 4.**Cisco Catalyst 2960-Plus Series Performance

|  |  |  |
| --- | --- | --- |
| **Performance and Scalability** | | |
|  | LAN Base (-L) Models | LAN Lite (-S) Models |
| Forwarding bandwidth | 16 Gbps | 16 Gbps |
| Maximum active VLANs | 255 | 64 |
| VLAN IDs available | 4K | 4K |
| Maximum transmission unit (MTU) - L3 packet | 9000 bytes | 9000 bytes |
| Jumbo frame - Ethernet frame | 9018 bytes | 9018 bytes |

\* Switching bandwidth is full-duplex capacity.

**Table 5.**Cisco Catalyst 2960-Plus Series Forwarding Performance

|  |  |
| --- | --- |
| **Forwarding Rate: 64-Byte L3 Packets, Millions of packets per second** | |
| Cisco Catalyst 2960-Plus 48PST-L | 13.1 |
| Cisco Catalyst 2960-Plus 24PC-L | 6.5 |
| Cisco Catalyst 2960-Plus 24LC-L | 6.5 |
| Cisco Catalyst 2960-Plus 48TC-L | 10.1 |
| Cisco Catalyst 2960-Plus 24TC-L | 6.5 |
| Cisco Catalyst 2960-Plus 48PST-S | 13.1 |
| Cisco Catalyst 2960-Plus 24PC-S | 6.5 |
| Cisco Catalyst 2960-Plus 24LC-S | 6.5 |
| Cisco Catalyst 2960-Plus 48TC-S | 10.1 |
| Cisco Catalyst 2960-Plus 24TC-S | 6.5 |

**Table 6.**Cisco Catalyst 2960-Plus Mechanical and Environmental Specifications

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Dimensions (H x W x D)** | | | | |
| Model | Inches | | Centimeters | |
| Cisco Catalyst 2960-Plus 48PST-L | 1.73 x 17.70 x 13.07 | | 4.4 x 45.0 x 33.2 | |
| Cisco Catalyst 2960-Plus 24PC-L |
| Cisco Catalyst 2960-Plus 24LC-L |
| Cisco Catalyst 2960-Plus 48TC-L | 1.73 x 17.70 x 9.52 | | 4.4 x 45.0 x 24.2 | |
| Cisco Catalyst 2960-Plus 24TC-L |
| Cisco Catalyst 2960-Plus 48PST-S | 1.73 x 17.70 x 13.07 | | 4.4 x 45.0 x 33.2 | |
| Cisco Catalyst 2960-Plus 24PC-S |
| Cisco Catalyst 2960-Plus 24LC-S |
| Cisco Catalyst 2960-Plus 48TC-S | 1.73 x 17.70 x 9.52 | | 4.4 x 45.0 x 24.2 | |
| Cisco Catalyst 2960-Plus 24TC-S |
| **Weight** | | | | |
| Model | Pounds | | Kilograms | |
| Cisco Catalyst 2960-Plus 48PST-L | 12 | | 5.4 | |
| Cisco Catalyst 2960-Plus 24PC-L | 12 | | 5.4 | |
| Cisco Catalyst 2960-Plus 24LC-L | 10 | | 4.5 | |
| Cisco Catalyst 2960-Plus 48TC-L | 8 | | 3.6 | |
| Cisco Catalyst 2960-Plus 24TC-L | 8 | | 3.6 | |
| Cisco Catalyst 2960-Plus 48PST-S | 12 | | 5.4 | |
| Cisco Catalyst 2960-Plus 24PC-S | 12 | | 5.4 | |
| Cisco Catalyst 2960-Plus 24LC-S | 10 | | 4.5 | |
| Cisco Catalyst 2960-Plus 48TC-S | 8 | | 3.6 | |
| Cisco Catalyst 2960-Plus 24TC-S | 8 | | 3.6 | |
| **Environmental Ranges** | | | | |
|  | Fahrenheit | | Centigrade | |
| Operating temperature up to 5000 ft (1500 m) | 23º to 113ºF | | -5º to 45ºC | |
| Operating temperature up to 10,000 ft (3000 m) | 23º to 104ºF | | -5º to 40ºC | |
| Short-term exception at sea level\* | 23º to 131ºF | | -5º to 55ºC | |
| Short-term exception up to 5000 feet (1500 m)\* | 23º to 122ºF | | -5º to 50ºC | |
| Short-term exception up to 10,000 feet (3000 m)\* | 23º to 113ºF | | -5º to 45ºC | |
| Short-term exception up to 13,000 feet (4000 m)\* | 23º to 104ºF | | -5º to 40ºC | |
| Storage temperature up to 15,000 feet (4573 m) | 23º to 158ºF | | -25º to 70ºC | |
|  | Feet | | Meters | |
| Operating altitude | Up to 10,000 | | Up to 3,000 | |
| Storage altitude | Up to 13,000 | | Up to 4,000 | |
| Operating relative humidity | 10% to 95% noncondensing | | | |
| Storage relative humidity | 10% to 95% noncondensing | | | |
| **Acoustic Noise** | | | | |
| Measured per ISO 7779 and declared per ISO 9296. | | | | |
| Bystander positions operating mode at 25°C ambient. | | | | |
|  | Sound Pressure, dBA | | Sound Power, dbA | |
| Model | Typical, LpAm | Maximum, LpAD | Typical, LwA | Maximum, LwAD |
| Cisco Catalyst 2960-Plus 48PST-L | 41 | 44 | 51 | 54 |
| Cisco Catalyst 2960-Plus 24PC-L | 43 | 46 | 53 | 56 |
| Cisco Catalyst 2960-Plus 24LC-L | 43 | 46 | 53 | 56 |
| Cisco Catalyst 2960-Plus 48TC-L | 33 | 36 | 43 | 46 |
| Cisco Catalyst 2960-Plus 24TC-L | 33 | 36 | 43 | 46 |
| Cisco Catalyst 2960-Plus 48PST-S | 41 | 44 | 51 | 54 |
| Cisco Catalyst 2960-Plus 24PC-S | 43 | 46 | 53 | 56 |
| Cisco Catalyst 2960-Plus 24LC-S | 43 | 46 | 53 | 56 |
| Cisco Catalyst 2960-Plus 48TC-S | 33 | 36 | 43 | 46 |
| Cisco Catalyst 2960-Plus 24TC-S | 33 | 36 | 43 | 46 |
| **Predicted Reliability** | | | | |
| Model | MTBF in thousands of hours\*\* | | | |
| Cisco Catalyst 2960-Plus 48PST-L | 312 | | | |
| Cisco Catalyst 2960-Plus 24PC-L | 382 | | | |
| Cisco Catalyst 2960-Plus 24LC-L | 498 | | | |
| Cisco Catalyst 2960-Plus 48TC-L | 623 | | | |
| Cisco Catalyst 2960-Plus 24TC-L | 667 | | | |
| Cisco Catalyst 2960-Plus 48PST-S | 312 | | | |
| Cisco Catalyst 2960-Plus 24PC-S | 381 | | | |
| Cisco Catalyst 2960-Plus 24LC-S | 498 | | | |
| Cisco Catalyst 2960-Plus 48TC-S | 623 | | | |
| Cisco Catalyst 2960-Plus 24TC-S | 667 | | | |

\*Not more than the following in 1 year: 96 consecutive hours, or 360 hours total, or 15 occurrences.  
\*\*Based on Telcordia SR-332 Issue 3 methodology.

**Table 7.**Connectors and Interfaces

|  |
| --- |
| **Ethernet Interfaces** |
| • 10BASE-T ports: RJ-45 connectors, 2-pair Category 3, 4, or 5 unshielded twisted-pair (UTP) cabling  • 100BASE-TX ports: RJ-45 connectors, 2-pair Category 5 UTP cabling  • 1000BASE-T ports: RJ-45 connectors, 4-pair Category 5 UTP cabling  • 1000BASE-T SFP-based ports: RJ-45 connectors, 4-pair Category 5 UTP cabling |
| **SFP and SFP+ Interfaces** |
| For information about supported SFP/SFP+ modules, refer to the Transceiver Compatibility matrix tables at [cisco.com/en/US/products/hw/modules/ps5455/products\_device\_support\_tables\_list.html](https://www.cisco.com/en/US/products/hw/modules/ps5455/products_device_support_tables_list.html). |
| **Indicator LEDs** |
| • Per-port status: Link integrity, disabled, activity, speed, and full-duplex  • System status, Port Status, RPS, link duplex, PoE, and link speed |
| **Console** |
| Cisco Catalyst console cables:  • CAB-CONSOLE-RJ45 Console cable 6 ft. with RJ-45 |
| **Power** |
| • The internal power supply is an auto-ranging unit and supports input voltages between 100 and 240V AC.  • Use the supplied AC power cord to connect the AC power connector to an AC power outlet.  • The Cisco RPS connector offers a connection for an optional Cisco RPS 2300 that uses AC input and supplies DC output to the switch.  • Only the Cisco RPS 2300 (model PWR-RPS2300) should be attached to the redundant-power-system receptacle. |

**Table 8.**Management and Standards Support

|  |  |  |
| --- | --- | --- |
| **Category** | **Specification** | |
| Management | • BRIDGE-MIB  • CISCO-CABLE-DIAG-MIB  • CISCO-CDP-MIB  • CISCO-CLUSTER-MIB  • CISCO-CONFIG-COPY-MIB  • CISCO-CONFIG-MAN-MIB  • CISCO-DHCP-SNOOPING-MIB  • CISCO-ENTITY-VENDORTYPE-OID-MIB  • CISCO-ENVMON-MIB  • CISCO-ERR-DISABLE-MIB  • CISCO-FLASH-MIB  • CISCO-FTP-CLIENT-MIB  • CISCO-IGMP-FILTER-MIB  • CISCO-IMAGE-MIB  • CISCO-IP-STAT-MIB  • CISCO-LAG-MIB  • CISCO-MAC-NOTIFICATION-MIB  • CISCO-MEMORY-POOL-MIB  • CISCO-PAGP-MIB  • CISCO-PING-MIB  • CISCO-POE-EXTENSIONS-MIB  • CISCO-PORT-QOS-MIB  • CISCO-PORT-SECURITY-MIB  • CISCO-PORT-STORM-CONTROL-MIB  • CISCO-PRODUCTS-MIB  • CISCO-PROCESS-MIB  • CISCO-RTTMON-MIB  • CISCO-SMI-MIB  • CISCO-STP-EXTENSIONS-MIB  • CISCO-SYSLOG-MIB | • CISCO-TC-MIB  • CICSO-TCP-MIB  • CISCO-UDLDP-MIB  • CISCO-VLAN-IFTABLE  • RELATIONSHIP-MIB  • CISCO-VLAN-MEMBERSHIP-MIB  • CISCO-VTP-MIB  • ENTITY-MIB  • ETHERLIKE-MIB  • IEEE8021-PAE-MIB  • IEEE8023-LAG-MIB  • IF-MIB  • INET-ADDRESS-MIB  • OLD-CISCO-CHASSIS-MIB  • OLD-CISCO-FLASH-MIB  • OLD-CISCO-INTERFACES-MIB  • OLD-CISCO-IP-MIB  • OLD-CISCO-SYS-MIB  • OLD-CISCO-TCP-MIB  • OLD-CISCO-TS-MIB  • RFC1213-MIB  • RMON-MIB  • RMON2-MIB  • SNMP-FRAMEWORK-MIB  • SNMP-MPD-MIB  • SNMP-NOTIFICATION-MIB  • SNMP-TARGET-MIB  • SNMPv2-MIB  • TCP-MIB  • UDP-MIB  • ePM MIB |
|  | For an updated list of supported MIBs, refer to the MIB Locator at [cisco.com/go/mibs](https://www.cisco.com/go/mibs). | |
| Standards | • IEEE 802.1D Spanning Tree Protocol  • IEEE 802.1p CoS Prioritization  • IEEE 802.1Q VLAN  • IEEE 802.1s  • IEEE 802.1w  • IEEE 802.1X  • IEEE 802.1ab (LLDP)  • IEEE 802.3ad  • IEEE 802.3af  • IEEE 802.3ah (100BASE-X single/multimode fiber only)  • IEEE 802.3x full duplex on 10BASE-T, 100BASE-TX, and 1000BASE-T ports | • IEEE 802.3 10BASE-T  • IEEE 802.3u 100BASE-TX  • IEEE 802.3ab 1000BASE-T  • IEEE 802.3z 1000BASE-X  • RMON I and II standards  • SNMP v1, v2c, and v3 |
| RFC compliance | • RFC 768 - UDP  • RFC 783 - TFTP  • RFC 791 - IP  • RFC 792 - ICMP  • RFC 793 - TCP  • RFC 826 - ARP  • RFC 854 - Telnet  • RFC 951 - Bootstrap Protocol (BOOTP)  • RFC 959 - FTP  • RFC 1112 - IP Multicast and IGMP  • RFC 1157 - SNMP v1  • RFC 1166 - IP Addresses  • RFC 1256 - Internet Control Message Protocol (ICMP) Router Discovery  • RFC 1305 - NTP  • RFC 1492 - TACACS+  • RFC 1493 - Bridge MIB  • RFC 1542 - BOOTP extensions  • RFC 1643 - Ethernet Interface MIB  • RFC 1757 - RMON | • RFC 1901 - SNMP v2C  • RFC 1902-1907 - SNMP v2  • RFC 1981 - Path MTU Discovery for IPv6  • FRC 2068 - HTTP  • RFC 2131 - DHCP  • RFC 2138 - RADIUS  • RFC 2233 - IF MIB v3  • RFC 2373 - IPv6 Aggregatable Address  • RFC 2460 - IPv6  • RFC 2461 - IPv6 Neighbor Discovery  • RFC 2462 - IPv6 Autoconfiguration  • RFC 2463 - ICMP IPv6  • RFC 2474 - Differentiated Services (DiffServ) Precedence  • RFC 2597 - Assured Forwarding  • RFC 2598 - Expedited Forwarding  • RFC 2571 - SNMP Management  • RFC 3046 - DHCP Relay Agent Information Option  • RFC 3376 - IGMP v3  • RFC 3580 - 802.1X RADIUS |

**Table 9.**Voltage and Power Ratings

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Input Voltage and Current** | | | | |
| Model | Voltage (Auto ranging) | Current (Amperes) | | Frequency |
| Cisco Catalyst 2960-Plus 48PST-L | 100 to 240 VAC | 4.0 - 2.0 | | 50 to 60Hz |
| Cisco Catalyst 2960-Plus 24PC-L | 4.0 - 2.0 | |
| Cisco Catalyst 2960-Plus 24LC-L | 1.4 - 0.8 | |
| Cisco Catalyst 2960-Plus 48TC-L | 0.6 - 0.3 | |
| Cisco Catalyst 2960-Plus 24TC-L | 0.4 - 0.2 | |
| Cisco Catalyst 2960-Plus 48PST-S | 4.0 - 2.0 | |
| Cisco Catalyst 2960-Plus 24PC-S | 4.0 - 2.0 | |
| Cisco Catalyst 2960-Plus 24LC-S | 1.4 - 0.8 | |
| Cisco Catalyst 2960-Plus 48TC-S | 0.6 - 0.3 | |
| Cisco Catalyst 2960-Plus 24TC-S | 0.4 - 0.2 | |
| **Power Rating (kVA)** | | | | |
| Cisco Catalyst 2960-Plus 48PST-L | 0.46 | | | |
| Cisco Catalyst 2960-Plus 24PC-L | 0.43 | | | |
| Cisco Catalyst 2960-Plus 24LC-L | 0.16 | | | |
| Cisco Catalyst 2960-Plus 48TC-L | 0.04 | | | |
| Cisco Catalyst 2960-Plus 24TC-L | 0.03 | | | |
| Cisco Catalyst 2960-Plus 48PST-S | 0.46 | | | |
| Cisco Catalyst 2960-Plus 24PC-S | 0.43 | | | |
| Cisco Catalyst 2960-Plus 24LC-S | 0.16 | | | |
| Cisco Catalyst 2960-Plus 48TC-S | 0.04 | | | |
| Cisco Catalyst 2960-Plus 24TC-S | 0.02 | | | |
| **DC Input Voltages (RPS Input)** | | | | |
| Cisco Catalyst 2960-Plus 48PST-L | 3A at 12V | | 7A at -52V | |
| Cisco Catalyst 2960-Plus 24PC-L | 2A at 12V | | 7A at -52V | |
| Cisco Catalyst 2960-Plus 24LC-L | 2A at 12V | | 3A at -52V | |
| Cisco Catalyst 2960-Plus 48TC-L | 3A at 12V | | - | |
| Cisco Catalyst 2960-Plus 24TC-L | 2A at 12V | | - | |
| Cisco Catalyst 2960-Plus 48PST-S | 3A at 12V | | 7A at -52V | |
| Cisco Catalyst 2960-Plus 24PC-S | 2A at 12V | | 7A at -52V | |
| Cisco Catalyst 2960-Plus 24LC-S | 2A at 12V | | 3A at -52V | |
| Cisco Catalyst 2960-Plus 48TC-S | 3A at 12V | | - | |
| Cisco Catalyst 2960-Plus 24TC-S | 2A at 12V | | - | |

**Table 10.**Power Consumption

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Measured Power Consumption, Watts** | | | | |
| Model | 0% traffic | 10% traffic | 100% traffic | ATIS weighted average |
| Cisco Catalyst 2960-Plus 48PST-L | 51.1 | 50.8 | 51.4 | 50.9 |
| Cisco Catalyst 2960-Plus 24PC-L | 35.4 | 35.3 | 35.6 | 35.3 |
| Cisco Catalyst 2960-Plus 24LC-L | 25.9 | 25.7 | 26.1 | 25.8 |
| Cisco Catalyst 2960-Plus 48TC-L | 30.4 | 30.2 | 30.6 | 30.2 |
| Cisco Catalyst 2960-Plus 24TC-L | 18.4 | 18.3 | 18.6 | 18.3 |
| Cisco Catalyst 2960-Plus 48PST-S | 50.8 | 50.3 | 51.1 | 50.5 |
| Cisco Catalyst 2960-Plus 24PC-S | 35.0 | 34.8 | 35.2 | 34.9 |
| Cisco Catalyst 2960-Plus 24LC-S | 25.9 | 25.7 | 26.1 | 25.8 |
| Cisco Catalyst 2960-Plus 48TC-S | 29.9 | 29.7 | 30.2 | 29.8 |
| Cisco Catalyst 2960-Plus 24TC-S | 18.8 | 18.7 | 19.1 | 18.8 |

\* Using ATIS-0600015.03.2009 methodology.

**Disclaimer:** All power consumption numbers were measured under controlled laboratory conditions and are provided as an estimate.

**Note:**The wattage rating on the power supply does not represent the actual power draw. It indicates the maximum power draw possible by the power supply. This rating can be used for facility capacity planning. For PoE switches, cooling requirements are smaller than the total power draw because a significant portion of the load is dissipated in the endpoints.

Table 11 provides safety and compliance information.

**Table 11.**Safety and Compliance

|  |  |
| --- | --- |
| **Category** | **Certifications** |
| Regulatory Compliance | Products should comply with CE Marking per directives 2004/108/EC and 2006/95/EC |
| Safety | UL 60950-1 Second Edition  CAN/CSA-C22.2 No. 60950-1 Second Edition  EN 60950-1 Second Edition  IEC 60950-1 Second Edition  AS/NZS 60950-1 |
| EMC - Emissions | 47CFR Part 15 (CFR 47) Class A  AS/NZS CISPR22 Class A  CISPR22 Class A  EN55022 Class A  ICES003 Class A  VCCI Class A  EN61000-3-2  EN61000-3-3  KN22 Class A  CNS13438 Class A |
| EMC - Immunity | EN55024  CISPR24  EN300386  KN24 |
| Environmental | Reduction of Hazardous Substances (RoHS) including Directive 2011/65/EU |
| Telco |  |

Cisco Enhanced Limited Lifetime Hardware Warranty

Cisco Catalyst 2960-Plus Series Switches come with an enhanced limited lifetime warranty (E-LLW). The E-LLW provides the same terms as Cisco's standard limited lifetime warranty but adds next-business-day delivery of replacement hardware, where available, and 90 days of 8X5 Cisco Technical Assistance Center (TAC) support.

Your formal warranty statement, including the warranty applicable to Cisco software, appears in the Cisco information packet that accompanies your Cisco product. We encourage you to review carefully the warranty statement shipped with your specific product before use.

Cisco reserves the right to refund the purchase price as its exclusive warranty remedy. For further information about warranty terms (Table 12), visit [cisco.com/go/warranty](https://www.cisco.com/go/warranty).

**Table 12.**Warranty Terms

|  |  |
| --- | --- |
| **Cisco Enhanced Limited Lifetime Hardware Warranty** | |
| Device covered | Applies to all Cisco Catalyst 2960-Plus Series Switches. |
| Warranty duration | As long as the original end-user continues to own or use the product. |
| End-of-life policy | In the event of discontinuance of product manufacture, Cisco warranty support is limited to five (5) years from the announcement of discontinuance. |
| Hardware replacement | Cisco or its service center will use commercially reasonable efforts to ship a Cisco Catalyst 2960-Plus replacement part for next business day delivery, where available. Otherwise, a replacement will be shipped within ten (10) working days after the receipt of the RMA request. Actual delivery times may vary depending on customer location. |
| Effective date | Hardware warranty commences from the date of shipment to the customer (and in case of resale by a Cisco reseller, not more than ninety [90] days after original shipment by Cisco). |
| TAC support | Cisco will provide during customer's local business hours, 8 hours per day, 5 days per week basic configuration, diagnosis, and troubleshooting of device-level problems for up to 90 days from the date of shipment of the originally purchased Cisco Catalyst 2960-Plus product. This support does not include a solution or network-level support beyond the specific device under consideration. |
| Cisco.com access | Warranty allows guest access only to Cisco.com. |

Software Update Policy

Software updates for the Cisco Catalyst 2960-Plus are available for free to registered customers at [cisco.com/go/support](https://cisco.com/go/support).

For more information about the Cisco Catalyst software update policy, visit [http://www.cisco.com/en/US/prod/collateral/switches/ps5718/ps4324/product\_bulletin\_c25-696974\_ps10745\_Products\_Bulletin.html](https://www.cisco.com/en/US/prod/collateral/switches/ps5718/ps4324/product_bulletin_c25-696974_ps10745_Products_Bulletin.html).

Technical Support and Services

Table 13 provides information about relevant technical services.

**Table 13.**Technical Services Available for Cisco Catalyst 2960-Plus Series Switches

|  |
| --- |
| **Technical Services** |
| Cisco SMARTnet Service  • Around-the-clock, global access to the Cisco TAC  • Unrestricted access to the extensive Cisco.com knowledge base and tools  • Next-business-day, 8x5x4, 24x7x4, or 24x7x2 advance hardware replacement and onsite parts replacement and installation available [1](https://www.cisco.com/en/US/prod/collateral/switches/ps5718/ps6406/product_data_sheet0900aecd80322c0c.html)  • Ongoing operating system software updates within the licensed feature set [2](https://www.cisco.com/en/US/prod/collateral/switches/ps5718/ps6406/product_data_sheet0900aecd80322c0c.html)  • Proactive diagnostics and real-time alerts on Smart Call Home enabled devices |
| Cisco Smart Foundation Service  • Next-business-day advance hardware replacement as available  • Access to SMB TAC during business hours (access levels vary by region)  • Access to Cisco.com SMB knowledge base  • Online technical resources through Smart Foundation Portal  • Operating system software bug fixes and patches |
| Cisco Smart Care Service  • Network-level coverage for the needs of small and medium-sized businesses  • Proactive health checks and periodic assessments of Cisco network foundation, voice, and security technologies  • Technical support for eligible Cisco hardware and software through Smart Care Portal  • Cisco operating system and application software updates and upgrades 2  • Next-business-day advance hardware replacement as available, 24x7x4 option available 1 |
| Cisco SP Base Service  • Around-the-clock, global access to the Cisco TAC  • Registered access to Cisco.com  • Next-business-day, 8x5x4, 24x7x4, and 24x7x2 advance hardware replacement. Return to factory option available 1  • Ongoing operating system software updates 2 |
| Cisco Focused Technical Support Services  Three levels of premium, high-touch services are available:  • Cisco High-Touch Operations Management Service  • Cisco High-Touch Technical Support Service  • Cisco High-Touch Engineering Service  Valid Cisco SMARTnet® or SP Base contracts are required on all network equipment. |

[1](https://www.cisco.com/en/US/prod/collateral/switches/ps5718/ps6406/product_data_sheet0900aecd80322c0c.html) Advance hardware replacement is available in various service-level combinations. For example, 8x5xNBD indicates that shipment will be initiated during the standard 8-hour business day, 5 days a week (the generally accepted business days within the relevant region), with next-business-day (NBD) delivery. Where NBD is not available, same-day shipping is provided. Restrictions apply; review the appropriate service descriptions for details.

[2](https://www.cisco.com/en/US/prod/collateral/switches/ps5718/ps6406/product_data_sheet0900aecd80322c0c.html) Cisco operating system updates include the following: maintenance releases, minor updates, and major updates within the licensed feature set.

Ordering Information

Tables 14 through 18 provide information about orders, accessories, redundant power supplies, SFP modules, and power cords, respectively.

**Table 14.**Cisco Catalyst 2960-Plus Series Switches Ordering Information

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Part Number** | **10/100 Ethernet Interfaces** | **Uplink Interfaces** | **Cisco IOS Software Feature Set** | **Available PoE Power** |
| WS-C2960+48PST-L | 48 | 2 SFP and 2 1000BASE-T | LAN Base | 370W |
| WS-C2960+24PC-L | 24 | 2 (SFP or 1000BASE-T) | LAN Base | 370W |
| WS-C2960+24LC-L | 24 | 2 (SFP or 1000BASE-T) | LAN Base | 123W |
| WS-C2960+48TC-L | 48 | 2 (SFP or 1000BASE-T) | LAN Base | - |
| WS-C2960+24TC-L | 24 | 2 (SFP or 1000BASE-T) | LAN Base | - |
| WS-C2960+48PST-S | 48 | 2 SFP and 2 1000BASE-T | LAN Lite | 370W |
| WS-C2960+24PC-S | 24 | 2 (SFP or 1000BASE-T) | LAN Lite | 370W |
| WS-C2960+24LC-S | 24 | 2 (SFP or 1000BASE-T) | LAN Lite | 123W |
| WS-C2960+48TC-S | 48 | 2 (SFP or 1000BASE-T) | LAN Lite | - |
| WS-C2960+24TC-S | 24 | 2 (SFP or 1000BASE-T) | LAN Lite | - |

**Table 15.**Cisco Catalyst 2960-Plus Accessories

|  |  |
| --- | --- |
| **Part Numbers** | **Description** |
| CAB-CONSOLE-RJ45 | Console cable 6 ft with RJ45 |
| RCKMNT-1RU= | Spare rack-mount kit for Cisco Catalyst 2960 and 2960-Plus Series for 19- and 24-inch racks |
| RCKMNT-REC-1RU= | 1 RU recessed rack-mount kit for Cisco Catalyst 2960 and 2960-Plus Series |
| PWR-CLP | Power cable restraining clip |

**Table 16.**Cisco Catalyst 2960-Plus Redundant Power Supply Options

|  |  |
| --- | --- |
| **Part Numbers** | **Description** |
| PWR-RPS2300 | Cisco Redundant Power System 2300 and blower, no power supply |
| BLNK-RPS2300= | Spare bay insert for Cisco Redundant Power System 2300 |
| CAB-RPS2300= | Spare RPS2300 cable for Cisco Catalyst 2960 switches |
| BLWR-RPS2300= | Spare 45 CFM blower for RPS 2300 |
| C3K-PWR-750WAC= | RPS 2300 750W AC power supply spare for Cisco Catalyst 2960 switches |
| ACC-RPS2300= | Spare accessory kit for Cisco Redundant Power System 2300 |

For more information about the RPS-2300, visit [cisco.com/en/US/products/ps7130](https://cisco.com/en/US/products/ps7130).

**Table 17.**Cisco Catalyst 2960-Plus SFP Modules

|  |
| --- |
| **SFP and SFP+ Modules** |
| For the list of supported SFP and SFP+ modules, visit [cisco.com/en/US/products/hw/modules/ps5455/products\_device\_support\_tables\_list.html](https://www.cisco.com/en/US/products/hw/modules/ps5455/products_device_support_tables_list.html). |

**Table 18.**Power Cords for Cisco Catalyst 2960-Plus Series

|  |  |
| --- | --- |
| **Part Numbers** | **Description** |
| CAB-AC | AC Power Cord (US, Canada), C13, NEMA 5-15P, 2.5m |
| CAB-ACE | AC Power Cord (Europe), C13, CEE 7, 1.5m |
| CAB-ACI | AC Power Cord (Italy), C13, CEI 23-16, 2.5m |
| CAB-ACU | AC Power Cord (UK), C13, BS 1363, 2.5m |
| CAB-ACA | AC Power Cord (China/Australia), C13, AS 3112, 2.5m |
| CAB-ACS | AC Power Cord (Switzerland), C13, IEC 60884-1, 2.5m |
| CAB-ACR | AC Power Cord (Argentina), C13, EL 219 (IRAM 2073), 2.5m |
| CAB-ACC | AC Power Cord (China), C13, PRC/3 GB2099/GB1002 |
| CAB-JPN | AC Power Cord (Japan), C13, Japan 2-prong, 1.8m |
| CAB-IND-10A | AC Power Cord (India), C13, IS1293, 2.5m |
| CAB-ACBZ-10A | AC Power Cord (Brazil), C13,BR-3-20, 10A |
| CAB-ACSA | AC Power Cord (South Africa), C15, SABS 164-1, 1.8m |

# Cisco 1941W Integrated Services Router

Product Names: CISCO1941/K9, CISCO1941W-A/K9, CISCO1941W-P/K9, CISCO1941W-N/K9, CISCO1941W-C/K9, CISCO1941W-I/K9, and CISCO  
1941W-T/K9

Cisco® 1900 Series Integrated Services Routers build on 25 years of Cisco innovation and product leadership. The new platforms are architected to enable the next phase of branch-office evolution, providing rich media collaboration and virtualization to the branch while maximizing operational cost savings The Integrated Services Routers Generation 2 platforms are future-enabled with multi-core CPUs, Gigabit Ethernet switching with enhanced POE, and new energy monitoring and control capabilities while enhancing overall system performance. Additionally, a new Cisco IOS® Software Universal image and Services Ready Engine module enables you to decouple the deployment of hardware and software, providing a stable technology foundation that can quickly adapt to evolving network requirements. Overall, the Cisco 1900 Series offer unparalleled total cost of ownership savings and network agility through the intelligent integration of market-leading security, unified communications, wireless, and application services.

**Product Overview**

Cisco® 1941 builds on the best-in-class offering of the existing Cisco 1841 Integrated Services Routers by offering 2 models - Cisco 1941 and Cisco 1941W. In addition to the support of a wide range of wireless and wired connectivity options supported on the Cisco 1941 Series, Cisco 1941W offers integration of IEEE 802.11n access point which is backward compatible with IEEE 802.11a/b/g access points.

All Cisco 1900 Series Integrated Services Routers offer embedded hardware encryption acceleration, optional firewall, intrusion prevention, and application services. In addition, the platforms support the industry's widest range of wired and wireless connectivity options such as T1/E1, xDSL, 3G, 4G LTE, and GE.

**Figure 1.**Cisco 1941 Integrated Services Router

[](https://www.cisco.com/c/dam/en/us/products/collateral/routers/1900-series-integrated-services-routers-isr/data_sheet_c78_556319.doc/_jcr_content/renditions/data_sheet_c78_556319_0.jpg)

**Key Business Benefits**

The Integrated Services Routers Generation 2 (ISR G2) routers provide superior services integration and agility. Designed for scalability, the modular architecture of these platforms enables you to grow and adapt to your business needs.

Table 1 lists the business benefits of the Cisco 1900.

**Table 1.**Key Features and Benefits of the Cisco 1941 Integrated Services Router Series

|  |  |
| --- | --- |
| **Benefits** | **Description** |
| Service Integration | ● The Cisco 1941 Series offer increased levels of services integration with data, security, wireless, and mobility services enabling greater efficiencies cost savings. |
| Services on Demand | ● A single Cisco IOS ® Software Universal image is installed on each ISR G2. The Universal image contains all of the Cisco IOS technology sets which can be activated with a software license. This allows your business to quickly deploy advanced features without downloading a new IOS image. Additionally, the larger default memory is included to support the new capabilities.  ● The Cisco Services Ready Engine (SRE) enables a new operational model which allows you to reduce capital expenditures (Capex) and deploy a variety of application services as needed on a single integrated computer services module. |
| High Performance with Integrated Services | ● The Cisco 1900 Series enables deployment in high-speed WAN environments with concurrent services enabled up to 25 Mbps.  ● Multi-Gigabit Fabric enables high bandwidth module to module communication without compromising routing performance. |
| Network Agility | ● Designed to address customer business requirements, Cisco 1941 Series with the modular architecture, offers a performance range of modular interfaces and services as your network needs grow.  ● Modular interfaces offer increased bandwidth, a diversity of connection options, and network resiliency. |
| Energy Efficiency | ● The Cisco 1941 Series architecture provides energy savings features that include the following:  ◦   The Cisco 1900 Series offers intelligent power management and allows the customer to control power to the modules based on the time of day. Cisco Energy Wise technology will be supported in the future.  ◦   Services integration and modularity on a single platform performing multiple functions optimizes raw materials consumption and energy usage.  ◦   Platform flexibility and ongoing development of both hardware and software capabilities lead to a longer product lifecycle, lowering all aspects of the total cost of ownership, including materials and energy use.  ◦   High-efficiency power supplies are provided with each platform. |
| Investment Protection | ● The Cisco 1941 Series maximizes investment protection by supporting:  ◦   Reuse of a broad array of existing modules supported on the original Integrated Services Routers provides a lower cost of ownership.  ◦   Rich set of Cisco IOS Software features carried forward from the original Integrated Services Routers and delivered in the universal image.  ◦   Flexibility to grow as your business needs evolve. |

**Architecture and Modularity**

The Cisco 1941 Series 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 expanding customer requirements, increased bandwidth, and fully integrated power distribution to modules supporting 802.3af Power over Ethernet (PoE) and Cisco Enhanced PoE (ePoE). Table 2 lists the architectural features and benefits of the Cisco 1941 Series.

**Table 2.**Architectural Features and Benefits

| **Architectural Feature** | **Benefits** |
| --- | --- |
| Modular Platform | ● The Cisco 1941 Series ISR are highly modular platforms with multiple module slots to provide connectivity and services for varied branch network requirements.  ● The ISRs offer an industry-leading breadth of LAN and WAN connectivity options through modules to accommodate field upgrades to future technologies without requiring the replacement of the platform. |
| Processors | ● The Cisco 1941 Series is powered by high-performance multi-core processors that support the growing demands of branch office networks by supporting high throughput WAN requirements. |
| Multigigabit Fabric | ● The Cisco 1941 introduces an innovative Multigigabit Fabric (MGF) which allows for the efficient module-to-module communication, enabling direct service interactions across modules while reducing the overhead on the router processor. |
| Embedded IPSec VPN Hardware Acceleration | ● Embedded hardware encryption acceleration is enhanced to provide higher scalability, which, combined with an optional Cisco IOS Security license, enables WAN link security and VPN services (IPSec acceleration).  ● The onboard encryption hardware outperforms the Advanced Integration Modules of previous generations. |
| Integrated Gigabit Ethernet Ports | ● All onboard WAN ports are 10/100/1000 Gigabit Ethernet WAN routed ports. |
| Innovative universal-serial-bus (USB)-based console access | ● A new, innovative, mini-B USB console port supports management connectivity when traditional serial ports are not available.  ● The traditional console and auxiliary ports are also available. Either the USB-based console or the RJ-45-based console port can be used to configure the router. |
| Optional Integrated Power Supply for Distribution of Power Over Ethernet (PoE) | ● An optional upgrade to the internal power supply provides in-line power (802.3af-compliant Power-over-Ethernet [PoE] and Cisco standard inline power) to optional integrated switch modules. |
| Integrated Wireless LAN | ● The Cisco 1941 offers a secure integrated access point in a single device.  ● The integrated access point is based on the IEEE 802.11n draft 2.0 standard that uses MIMO (Multi-Input, Multiple output) to improve coverage for existing 802.11a/b/g clients and new 802.11n clients.  ● The Cisco 1941 supports dual radios - 802.11 b/g/n and 802.11a/n and is capable of operating in both autonomous and unified modes. |

**Modularity Features and Benefits**

The Cisco 1941 provides significantly enhanced modular capabilities (refer to Table 2) offering investment protection for customers. Most of the modules available on previous generations of Cisco routers, such as the Cisco 1841 ISR, are supported on the Cisco 1941. Additionally, modules used on the Cisco 1941 can easily be interchanged with other Cisco routers to provide maximum investment protection. Taking advantage of common interface cards across a network greatly reduces the complexity of managing inventory requirements, implementing large network rollouts, and maintaining configurations across a variety of branch-office sizes.

A complete list of supported modules is available at <https://www.cisco.com/go/1941>.

**Table 3.**Modularity - Features and Benefits

|  |  |
| --- | --- |
| **Feature** | **Benefits** |
| Cisco Enhanced High-Speed WAN Interface Card (EHWIC)  [data_sheet_c78_556319_1.jpg](https://www.cisco.com/c/dam/en/us/products/collateral/routers/1900-series-integrated-services-routers-isr/data_sheet_c78_556319.doc/_jcr_content/renditions/data_sheet_c78_556319_1.jpg) | ● The EHWIC slot replaces the high-speed WAN interface card (HWIC) slot and can natively support HWICs, WAN interface cards (WICs), wireless WAN 3G/4G LTE, voice interface cards (VICs), and voice/WAN interface cards (VWICs).  ● Two integrated EHWIC slots are available on the Cisco 1941 for flexible configurations for the support of two modules: One double-wide HWIC-D or single wide EHWIC/HWIC module and a second single wide E-HIC/HWIC module are supported.  ● Each HWIC Slot offers high data throughput capability.  ◦   Up to 1.6 Gbps aggregate towards the router processor.  ◦   Up to 2 Gbps aggregate to other module slots over Multigigabit Fabric (MGF). |
| Cisco Internal Services Module (ISM)  [data_sheet_c78_556319_2.gif](https://www.cisco.com/c/dam/en/us/products/collateral/routers/1900-series-integrated-services-routers-isr/data_sheet_c78_556319.doc/_jcr_content/renditions/data_sheet_c78_556319_2.gif) | ● A single ISM Slot provides flexibility to integrate intelligent service modules that do not require interface ports.  ● ISM replaces the Advanced Integration Module (AIM) slot; existing AIM modules are not supported in the ISM slot.  ● Each ISM Slot offers high data throughput capability.  ◦   Up to 4 Gbps aggregate towards the router processor.  ◦   Up to 2 Gbps aggregate to other module slots over Multigigabit Fabric (MGF).  ● Power to ISM slots can be managed by extensions similar to the Cisco Energy Wise framework, allowing organizations to reduce energy consumption in their network infrastructure. Full Energy Wise support will be available in future software releases.  **Note:** The Cisco 1941 cannot have ISM and WLAN on the same chassis. Please refer to ordering information for WLAN SKUs. |
| Compact Flash Slots | ● Two external Compact Flash slots are available on the Cisco 1941. Each slot can support high-speed storage densities upgradeable to 4GB in density. |
| USB 2.0 Ports | ● Two high-speed USB 2.0 ports are supported. The USB ports enable another mechanism to secure token capabilities and storage. |

**Cisco IOS Software**

The Cisco 1941 Series Integrated Services Routers deliver innovative technologies running on industry-leading Cisco IOS Software. Developed for wide deployment in the world’s most demanding enterprise, access, and service provider networks, Cisco IOS Software Release 15 M & T provides support for a comprehensive portfolio of Cisco technologies, including new functionality and features delivered in Releases 12.4 and 12.4T, and innovations that span multiple technology areas, including security, voice, high availability, IP Routing, and Multicast, Quality of Service (QoS), IP Mobility, Multiprotocol Label Switching (MPLS), VPNs, and embedded management.

Cisco IOS Software Licensing and Packaging

A single Cisco IOS Universal image encompassing all functions is delivered with the platforms. You can enable advanced features by activating a software license on the Universal image. In previous generations of access routers, these feature sets required you to download a new software image. Technology packages and feature licenses, enabled through the Cisco software licensing infrastructure, simplify software delivery and decrease the operational costs of deploying new features.

Four major technology licenses are available on the Cisco 1941 Series Integrated Services Routers; you can activate the licenses through the Cisco software activation process identified at <https://www.cisco.com/go/sa>.

●   IP Base: This technology package is available as default

●   Security (SEC) or Security with No Payload Encryption (SEC-NPE)

●   AppX: This license includes the DATA license feature set, Application Visibility and Control (AVC), and Cisco Wide Area Application Services (WAAS).

For additional information and details about Cisco IOS Software licensing and packaging on Cisco 1941 Series Integrated Services Routers, please visit <https://www.cisco.com/go/g2licensing>.

**Cisco ONE Software**

Cisco ONE™ Software offers a valuable and flexible way to buy software for the WAN, access, and data center domains. At each stage in the product lifecycle, Cisco ONE Software helps make buying, managing, and upgrading your network and infrastructure software easier. Cisco ONE Software provides:

●   Flexible licensing models to smoothly distribute customers’ software spending over time

●   Investment protection for software purchases through software services–enabled license portability

●   Access to updates, upgrades, and new technology from Cisco through Cisco® Software Support Services (SWSS)

Cisco ONE for WAN gives organizations broad capabilities for branch offices and the enterprise edge. Cisco ONE Foundation for WAN connects and secures your branch office while optimizing for cost. Cisco ONE WAN Collaboration integrates voice and video into your branch office and network edge.

**Key Branch-Office Services**

The Cisco Integrated Services Routers are industry-leading routers that offer unprecedented levels of service integration. Designed to meet the requirements of the branch office, these platforms provide a complete solution with voice, security, mobility, and data services. Businesses enjoy the benefit of deploying a single device that meets all their needs and saves on capital and operational expenses.

Integrated Network Security for Data and Mobility

Security is essential to protect a business’s 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. As part of the Cisco SAFE architectural framework that allows organizations to identify, prevent, and adapt to network security threats - the Cisco 1900 Series Integrated Services Routers facilitate secure business transactions and collaboration.

The Cisco IOS Software Security technology package license for the Cisco 1900 Series offers a wide array of common security features such as advanced application inspection and control, threat protection, and encryption architectures for enabling more scalable and manageable VPN networks in one solution set. The Cisco 1941 Series offers native hardware-based encryption acceleration to provide greater IPSec throughput with less overhead for the router processor when compared with software-based encryption solutions.

Cisco Integrated Services Routers offer a comprehensive and adaptable security solution for branch-office routers that include features such as:

●   **Secure connectivity:** Secure collaborative communications with Group Encrypted Transport VPN (GETVPN), Dynamic Multipoint VPN (DMVPN), or Enhanced Easy VPN.

●   **Integrated threat control:** Respond to sophisticated network attacks and threats using Cisco IOS Firewall, Cisco IOS Zone-Based Firewall, IOS IPS, IOS Content Filtering, and Flexible Packet Matching (FPM).

●   **Identity Management:** Intelligently protecting endpoints using technologies such as authentication, authorization, and accounting (AAA) and public key infrastructure (PKI).

Detailed information on the security features and solutions supported on the Cisco 1900 Series routers can be found at <https://www.cisco.com/go/routersecurity>.

**Wireless and Mobility Services**

Wireless LAN

The Cisco Integrated Services Routers supporting the Cisco Unified Wireless Network enable deployment of secure, manageable WLANs optimized for remote sites and branch offices, including fast secure mobility, survivable authentication, and simplified management. The Cisco Unified Wireless Network addresses critical points of potential failure and helps enable resiliency and survivability for WLANs at remote locations and branch offices. This solution protects the WLAN by providing fast recovery from a variety of faults that may occur. With Cisco's high availability for remote WLANs, hardware and software work together to enable rapid recovery from disruptions and help ensure fault transparency to users and network applications.

The new Cisco 1941W with IEEE 802.11n integrated access point support both unified and autonomous deployments. This integrated Wi-Fi access point offers IEEE 802.11n draft 2.0 standard support for mobile access to high-bandwidth data, voice, and video applications through the use of multiple-input, multiple-output (MIMO) technology that provides increased throughput, reliability, and predictability. IEEE 802.11n wireless networks create a cohesive working environment by combining the mobility of wireless with the performance of wired networks. Cisco has innovative, next-generation wireless solutions that offer greater performance and extended reach for pervasive wireless connectivity. IEEE 802.11n technology delivers outstanding reliability and up to nine times the throughput of current IEEE 802.11 a/b/g networks. It makes wireless networks an integral part of every type of organization by offering the following benefits:

●   Data rates of up to 600 Mbps support more users, devices, and mission-critical, bandwidth-intensive applications.

●   New MIMO technology provides predictable WLAN coverage and reliable connectivity.

●   Next-generation wireless technology provides superior investment protection to support emerging mobile applications.

These routers help extend corporate networks to secure remote sites while giving users access to the same applications found in corporate offices for both data and voice applications. When users require WLAN access, visibility and control of network security are even more critical at the remote site. The new fixed Cisco Integrated Services Routers meet this need with a single device that combines integrated IEEE 802.11a/b/g/n capabilities with security features such as Wi-Fi Protected Access (WPA), including authentication with IEEE 802.1X with the Cisco Light Extensible Authentication Protocol (LEAP) and Protected EAP (PEAP) and encryption with the WPA Temporal Key Integrity Protocol (TKIP).

Wireless WAN

Cisco third- and fourth generation (3G and 4G, respectively) LTE wireless WAN (WWAN) modules combine traditional enterprise router functions, such as remote management, advanced IP services such as voice over IP (VoIP), and security, with mobility capabilities of 3G and 4G LTE WAN access. Using high-speed 3G or 4G LTE wireless networks, routers can replace or complement existing landline infrastructure, such as dialup, Frame Relay, and ISDN. Cisco 3G and 4G LTE solutions support 3G and 4G LTE standards High-Speed Packet Access (HSPA), Evolution Data Only/Evolution-Data Optimized (EVDO), and 4G LTE, providing you with a true multipath WAN backup and the ability to rapidly deploy primary WAN connectivity. For more information about 3G solutions on Cisco Integrated Services Routers, please refer to <https://www.cisco.com/go/3g> or <https://www.cisco.com/go/4g>.

Integrated LAN Switching

The Cisco 1941 Integrated Services Router Series will support the EHWIC LAN modules when they become available in the future. The Cisco 1941 Series support the existing single-wide EtherSwitch HWIC and the double-wide HWIC-D modules, which greatly expand the router’s capabilities by integrating industry-leading Layer 2 or Layer 3 switching.

**Application Services**

As organizations continue to centralize and consolidate their branch IT infrastructure to reduce cost and complexity in the branch office, 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 1941 Series provides the ability to host Cisco, 3rdparty, and custom applications on Cisco Services Ready Engine (SRE) module that seamlessly integrates into the router. The module has its processor, network interface, and memory that operate independently of the host router resources, helping to ensure maximum concurrent routing and application performance while reducing physical space requirements, lowering power consumption, and consolidating management.

Cisco Services Ready Engine

The Cisco Services Ready Engine solution is available in an Internal Service Module (ISM) form-factor. The Internal Service Module hardware offers up to a seven times performance improvement over the previous-generation Advanced Integration Modules and provides an x86 processor. The Cisco SRE module enables on-demand provisioning of branch-office applications on the Cisco 1900 Series platforms so that you can deploy the right application, at the right time, in the right place. The hardware and software decoupling provided by the service-ready deployment model enables applications to be provisioned on the module at the time of its installation or remotely anytime thereafter. Supported solutions include Cisco Application Extension Platform (AXP), Cisco Wireless LAN Controller (WLC), and other applications under development. The Service Ready Engine enables organizations of various sizes to future-proof their network by allowing them to quickly deploy new branch-office applications without deploying new hardware, reducing the cost of rolling out branch-office services.

WAAS Express

Organizations today face several unique wide area networks (WAN) challenges: the need to provide employees with constant access to centrally located information, the requirement to continuously back up and replicate mission-critical data to centrally managed data centers, the desire to provide a satisfactory experience for IP phone and video communication, and the mandate to control bandwidth costs without sacrificing application availability and performance.

Cisco WAAS Express is designed to help organizations address these challenges. Cisco WAAS Express extends the [Cisco WAAS product portfolio](https://wwwin.cisco.com/dss/adbu/waas/), with a small-footprint, cost-effective Cisco IOS Software-based software solution integrated into the ISR G2 to offer bandwidth optimization and application acceleration capabilities. Cisco WAAS Express increases remote user productivity, reduces WAN bandwidth costs, and offers investment protection by interoperating with existing Cisco WAAS infrastructure. Cisco WAAS Express is unique in providing network transparency, improving deployment flexibility with on-demand service enablement, and integrating with native Cisco IOS Software-based services such as security, Netflow, and QoS.

Cisco WAAS Express is fully interoperable with WAAS on SM-SRE modules, WAAS appliances and can be managed by a common WAAS Central Manager.

Cisco WAAS Express is available in Cisco IOS Software from Release 15.1(2)T1.

Further information on Cisco WAAS Express can be found at <https://wwwin.cisco.com/artg/products/waas/>.

Managing Your Integrated Services Routers

Network Management applications are instrumental in lowering Operating Expenditures (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 Integrated Services Router 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 OpenX and productivity goals. Underpinning those applications are the embedded management features available in every ISR. The new ISRs continue a tradition of broad and deep manageability features within the devices. Features such as IPSLA, EEM, NetFlow, allow you to know what's going on in your network at all times. These features along with SNMP and SYSLOG support enable your organization’s management applications.

Refer to Tables 4, 5, and 6 for details on IOS, Network Management, and Manageability support on Cisco 1941 Series Integrated Services Routers.

**Table 4.**Cisco 1941 with Cisco IOS Software Feature and Protocol High-Level Support

|  |  |
| --- | --- |
| Protocols | IPv4, IPv6, static routes, 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 (IGMPv3) Protocol Independent Multicast sparse mode (PIM SM), PIM Source-Specific Multicast (SSM), Distance Vector Multicast Routing Protocol (DVMRP), IPSec, Generic Routing Encapsulation (GRE), Bi-Directional Forwarding Detection (BVD), IPv4-to-IPv6 Multicast, MPLS, L2TPv3, 802.1ag, 802.3ah, L2 and L3 VPN. |
| Encapsulations | 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), Point-to-Point Protocol over Ethernet (Pepo), and ATM. |
| Traffic management | QoS, Class-Based Weighted Fair Queuing (CBWFQ), Weighted Random Early Detection (WRED), Hierarchical QoS, Policy-Based Routing (PBR), Performance Routing (PfR), and Network-Based Advanced Routing (NBAR). |

Note:    For a more comprehensive list of features supported in Cisco IOS software refer to the Feature Navigator tool at: <https://www.cisco.com/go/fn>.

Table 5 highlights several integrated services router management capabilities that are available within Cisco IOS Software.

**Table 5.**Cisco IOS Software Management Capabilities

|  |  |
| --- | --- |
| **Feature** | **Description of Feature Supported by Cisco Integrated Services Routers** |
| [WSMA](https://www.cisco.com/en/US/docs/ios/netmgmt/configuration/guide/nm_cfg_wsma_ps6441_TSD_Products_Configuration_Guide_Chapter.html) | The Web Services Management Agent (WSMA) defines a mechanism through which you can manage a network device, retrieve configuration data information, and upload and manipulate new configuration data. WSMA uses XML-based data encoding that is transported by the Simple Object Access Protocol (SOAP) for the configuration data and protocol messages. |
| [EEM](https://www.cisco.com/go/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. |
| [IPSLA](https://www.cisco.com/go/ipsla) | Cisco IOS IP Service-Level Agreements (SLAs) enable you to assure new business-critical IP applications, as well as IP services that use data, voice, and video, in an IP network. |
| [SNMP](https://www.cisco.com/en/US/tech/tk648/tk362/tk605/tsd_technology_support_sub-protocol_home.html), [RMON](https://www.cisco.com/en/US/tech/tk648/tk362/tk560/tsd_technology_support_sub-protocol_home.html), [Syslog](https://www.cisco.com/en/US/tech/tk648/tk362/tk790/tsd_technology_support_sub-protocol_home.html), [NetFlow](https://www.cisco.com/go/netflow), [TR-069](https://www.cisco.com/en/US/docs/ios/bbdsl/configuration/guide/bba_tr069_agent.html) | Cisco 1900 Series Integrated Services Routers also support SNMP, Remote Monitoring (RMON), Syslog, NetFlow, and TR-069 in addition to the embedded management features previously mentioned. |

**Cisco Network Management Applications**

The applications listed in Table 6 are standalone products that you can purchase or download to manage your Cisco network devices. The applications are built 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](https://www.cisco.com/go/ciscocp) | ● Cisco Configuration Professional is a GUI device-management tool for Cisco IOS Software-based access routers. This tool simplifies routing, firewall, IPS, VPN, unified communications, and WAN and LAN configuration through GUI-based easy-to-use wizards. |
| Networkwide deployment, configuration, monitoring, and troubleshooting | [Cisco Works LMS](https://www.cisco.com/go/lms) | ●  Cisco Works LAN Management Solution (LMS) is a suite of integrated applications for simplifying day-to-day management of a Cisco end-to-end network, lowering OpenX while increasing network availability. Cisco Works LMS offers network managers an easy-to-use web-based interface for configuring, administering, and troubleshooting the Cisco integrated services routers, using new instrumentation such as Cisco IOS EEM.  ● In addition to supporting basic platform services of the integrated services router, Cisco Works also provides added-value support for the Cisco Service Ready Engine, enabling the management and distribution of software images to the SRE, thereby reducing the time and complexities associated with image management. |
| Networkwide staging, configuration, and compliance | [Cisco Works NCM](https://www.cisco.com/go/cwncm) | ●  CiscoWorks Network Compliance Manager (NCM) tracks and regulates configuration and software changes throughout a multivendor network infrastructure. It provides superior visibility into network changes and can track compliance with a broad variety of regulatory, IT, corporate governance, and technology requirements. |
| Security staging, configuration, and monitoring | [Cisco Security Manager](https://www.cisco.com/go/csmanager) | ● Cisco Security Manager is a leading enterprise-class application for managing security. It delivers provisioning of firewall, VPN, and intrusion-prevention-system (IPS) services across Cisco routers, security appliances, and switch service modules. The suite also includes the Cisco Security Monitoring, Analysis, and Response System (Cisco Security MARS) for monitoring and mitigation. |
| Configuration and provisioning | [Cisco Unified Provisioning Manager](https://www.cisco.com/go/cupm) | ● Cisco Unified Provisioning Manager provides a reliable and scalable web-based solution for managing a company’s crucial next-generation communications services. It manages unified communications services in integrated IP telephony, voicemail, and messaging environment. |
| Staging, deployment, and changes of licenses | [Cisco License Manager](https://www.cisco.com/go/clm) | ●  [Easily manage Cisco IOS Software activation and license management for a wide range of Cisco platforms running Cisco IOS Software as well as other operating systems with the secure client-server application Cisco License Manager](https://www.cisco.com/en/US/products/ps9677/products_ios_technology_home.html). |
| Staging, deployment, and changes to configuration and image files | [Cisco Configuration Engine](https://www.cisco.com/en/US/products/sw/netmgtsw/ps4617/index.html) | ● Cisco Configuration Engine is a secure network management product that provides zero-touch image and configuration distribution through centralized, template-based management. |

**Summary and Conclusion**

As businesses strive to lower the total cost of ownership in running their network and increase their overall employee productivity with more centralize and collaborative network applications, more intelligent branch office solutions are required. The Cisco 1941 Series offers these solutions by providing enhanced performance and increased modular density to support multiple services. The Cisco 1941 Series is designed to consolidate the functions of separate devices into a single, compact system that can be remotely managed.

**Product Specifications**

**Table 7.**Product Specifications of Cisco 1941 Integrated Services Router

|  | **Cisco1941, Cisco1941W** |
| --- | --- |
| Services and Slot Density | |
| Embedded hardware-based crypto acceleration (IPSec) | Yes |
| Total Onboard Gigabit Ethernet 10/100/1000 WAN ports | 2 |
| RJ-45-Based Ports | 2 |
| SFP-Based Ports | 0 |
| SM Slots | 0 |
| Double-Wide SM Slots | 0 |
| EHWIC Slots | 2 |
| Double-wide EHWIC slots (use of a double-wide EHWIC slot will consume two EHWIC slots) | 1 |
| ISM Slots | 1 (0 on the Cisco 1941W) |
| Memory (DDR2 Error Correction Code [ECC] ECC DRAM) - Default | 512 MB |
| Memory (DDR2 ECC DRAM) - Maximum | 2.0 GB |
| Compact Flash (external) - Default | slot 0: 256 MB  slot 1: none |
| Compact Flash (external) - Maximum | slot 0: 4 GB  slot 1: 4 GB |
| External USB flash memory 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 | AC, POE |
| Redundant Power Supply Support | No |
| Power Specifications | |
| AC Input Voltage | 100-240 V ~ |
| AC Input Frequency | 47-63 Hz |
| AC Input Current range AC Power Supply (Max) (Amps) | 1.5-0.6 |
| AC Input Surge Current | <50 A |
| Typical Power (No Modules) | 35 W |
| Maximum Power Capacity with AC power supply | 110 W |
| Maximum Power Capacity with PoE power supply (platform only) | 110 W |
| Maximum PoE device power capacity with PoE power supply | 80 W |
| Physical Specifications | |
| Dimensions (H x W x D) | 3.5 in x 13.5 in x 11.5 in |
| Rack Height | 2 RU |
| Rack-mount 19in. (48.3 cm) EIA | Included |
| Wall-mount (refer to installation guide for approved orientation) | Yes |
| Weight - with AC power supply (no modules) | 12 lbs |
| Weight - with POE power supply (no modules) | 12.8 lbs |
| Maximum Weight - Fully Configured | 14 lbs |
| Airflow | Front to Side |
| Environmental Specifications | |
| Operating Condition | |
| Temperature - 5906 feet (1800 m) max. altitude | 0-40˚C (32-104˚F) |
| Temperature - 9843 feet (3000 m) max. altitude | 0-25˚C (32-77˚F) |
| Altitude | 3000 m (10000 ft) |
| Humidity | 10 to 85% RH |
| Acoustic: Sound Pressure (Typ/Max) | 26/46 dBA |
| Acoustic: Sound Power (Typ/Max) | 36/55 dBA |
| Transporation/Storage Condition | |
| Temperature | -40-70˚C (-40-158˚F) |
| Humidity | 5 to 95%RH |
| Altitude | 4570m (15000 ft) |
| Regulatory 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 |
|  |
| Telecom | TIA/EIA/IS-968  CS-03  ANSI T1.101  ITU-T G.823, G.824  IEEE 802.3  RTTE Directive |

**WLAN Specifications**

**Table 8.**WLAN Specifications of the Cisco 1941W

| **Feature** | **Description** |
| --- | --- |
| WLAN hardware | ●  IEEE 802.11n draft 2.0 standards-based access point with 802.11a/b/g compatibility  ●  Automatic rate selection for 802.11g/n  ●  Dual Radios for 802.11b/g/n and 802.11a/n modes  ●  RP-TNC connectors for field-replaceable external antennas  ●  2-dBi default antenna gain  ●  2 x 3 multiple input, multiple output (MIMO) radio operation  ●  Wi-Fi 802.11n Draft v2.0 certified |
| WLAN software features | ●  Autonomous or unified access point  ●  Cisco WCS support for monitoring of autonomous-mode access points  ●  Option to maximize throughput or maximize range  ●  Software-configurable transmit power  ●  Radio roles, including access point, root bridge, non-root bridge, and workgroup bridge  ●  Wi-Fi Multimedia (WMM) certification  ●  Traffic specifications (TSPEC) Call Admission Control (CAC) to ensure voice quality is maintained  ●  Unscheduled Automatic Power Save Delivery (UPSD) to reduce latency |
| Unified WLAN management | ●  Unified access point features  ●  Supported by wireless LAN controller and Cisco WCS  ●  Configurable local or central switching for HREAP mode  ●  Radio management through Cisco WCS  ●  Transparent roaming with mobility groups |
| WLAN security features | ●  Standard 802.11i  ●  Wi-Fi Protected Access (WPA) and AES (WPA2)  ●  EAP authentication: Cisco LEAP, PEAP, Extensible Authentication Protocol Transport Layer Security (EAP TLS), Extensible Authentication Protocol-Flexible Authentication via Secure Tunneling (EAP-FAST), Extensible Authentication Protocol-Subscriber Information Module (EAP-SIM), Extensible Authentication Protocol-Message Digest Algorithm 5 (EAP-MD5), and Extensible Authentication Protocol-Tunneled TLS (EAP-TTLS)  ●  Static and dynamic Wired Equivalent Privacy (WEP)  ●  Temporal Key Integrity Protocol/Simple Security Network (TKIP/SSN) encryption  ●  MAC authentication and filter  ●  User database for survivable local authentication using LEAP and EAP-FAST  ●  Configurable limit to the number of wireless clients  ●  Configurable RADIUS accounting for wireless clients  ●  Pre-Shared Keys (PSKs) (WPA-small office or home office [WPA-SOHO]) |
| Certifications | [data_sheet_c78_556319_3.jpg](https://www.cisco.com/c/dam/en/us/products/collateral/routers/1900-series-integrated-services-routers-isr/data_sheet_c78_556319.doc/_jcr_content/renditions/data_sheet_c78_556319_3.jpg) |
| Service Set Identifiers (SSIDs) | 16 |
| Wireless VLANs | 16 |
| Encrypted wireless VLANs | 16 |
| Multiple Broadcast Service Set Identifiers (MBSSIDs) | 16 |

**Supported Modules**

Cisco 1941 Series support a wide range of modules that span industry leading breadth of services at the branch. Please refer to the link below for the list of modules supported on the Cisco 1900. <https://www.cisco.com/en/US/products/ps10538/products_relevant_interfaces_and_modules.html>.

**Ordering Information**

The Cisco 1941 is orderable at the [Cisco Ordering Home Page](https://www.cisco.com/en/US/ordering/or13/or8/order_customer_help_how_to_order_listing.html).

For more information about the Cisco 1900 Series, visit <https://www.cisco.com/go/1900>.

Table 9 gives ordering information for the Cisco 1941 Router. For information about how to order the Cisco 1900 Series, please visit the Cisco 1900 Series Ordering Guide. To place an order, visit the [Cisco Ordering Home Page](https://www.cisco.com/web/ordering/or13/or8/o25/ordering_solutions_category_home.html) and refer to Table 9, which provides basic ordering information. For additional product numbers, including the Cisco 1900 Series bundle offerings, please check the [Cisco 1900 Series Integrated Services Router Price List](https://tools.cisco.com/qtc/pricing/MainServlet) or contact your local Cisco account representative.

**Table 9.**Cisco 1941 Series Basic Ordering Information

|  |  |
| --- | --- |
| **Product Number** | **Product Description** |
| CISCO1941/K9 | Cisco 1941 with 2 onboard GE, 2 EHWIC slots, 1 ISM slot, 256MB CF default, 512MB DRAM default, IP Base. |
| CISCO1941W-A/K9 | Cisco 1941 Router w/802.11 a/b/g/n FCC Compliant, 2 onboard GE, 2 EHWIC slots, 256MB CF default, 512MB DRAM default, IP Base. |
| CISCO1941W-P/K9 | Cisco 1941 Router w/802.11 a/b/g/n Japan Compliant, 2 onboard GE, 2 EHWIC slots, 256MB CF default, 512MB DRAM default, IP Base. |
| CISCO1941W-N/K9 | Cisco 1941 Router w/802.11 a/b/g/n Australia, New Zealand & Singapore Compliant, 2 onboard GE, 2 EHWIC slots, 256MB CF default, 512MB DRAM default, IP Base. |
| CISCO1941W-C/K9 | Cisco 1941 Router w/802.11 a/b/g/n China Compliant, 2 onboard GE, 2 EHWIC slots, 256MB CF default, 512MB DRAM default, IP Base. |
| CISCO1941W-I/K9 | Cisco 1941 Router w/802.11 a/b/g/n Israel Compliant, 2 onboard GE, 2 EHWIC slots, 256MB CF default, 512MB DRAM default, IP Base. |
| CISCO1941W-T/K9 | Cisco 1941 Router w/802.11 a/b/g/n Brazil & Taiwan Compliant, 2 onboard GE, 2 EHWIC slots, 256MB CF default, 512MB DRAM default, IP Base. |

To download the Cisco ISR 1941 Cisco IOS Software release go to [Download Software](https://www.cisco.com/public/sw-center/index.shtml), click "Router Software," and go to Cisco ISR 1941 Integrated Services Router.

[Cisco ONE Software for WAN](https://www.cisco.com/c/en/us/products/collateral/software/one-wan/datasheet-c78-733012.html) is available for the ISR 1941.

Cisco ONE Software offers a complete solution that delivers an optimal experience over any connection while helping you get the most from your WAN investment with secure, fault-tolerant connectivity.

Benefits:

●   Connect branch offices and your campus securely at an optimal cost by improving application performance through application protocol acceleration and optimization techniques that offload the WAN.

●   Integrate voice and video across branch offices and your campus to increase productivity.

For ordering information for Cisco ONE Software for the ISR 1941, go to <https://www.cisco.com/c/en/us/products/software/one-wan/wan-part-numbers.html>.

**ISR Migration Options**

Cisco ISR 1900 Series Routers are included in the standard Cisco Technology Migration Program (TMP). Refer to <https://www.cisco.com/go/tmp> and contact your local Cisco account representative for program details.

**Warranty Information**

The Cisco 1900 Series Integrated Services Routers have a 1-year limited liability warranty.

**For More Information**

For more information about the Cisco ISR 1900 Series, visit <https://www.cisco.com/go/1900> or contact your local Cisco account representative.

**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 footprint across technologies. Planning and design services align technology with business goals and can increase the accuracy, speed, and efficiency of deployment. Technical services help 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 <https://www.cisco.com/go/services>.

Cisco SMARTnet® technical support for the Cisco 1900 Series 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

●   24-hour access to the industry’s largest dedicated technical support staff

**Cisco Capital**

Financing to Help You Achieve Your Objectives

Cisco Capital can help you acquire the technology you need to achieve your objectives and stay competitive. We can help you reduce CapEx. Accelerate your growth. Optimize your investment dollars and ROI. Cisco Capital financing gives you flexibility in acquiring hardware, software, services, and complementary third-party equipment. And there’s just one predictable payment. Cisco Capital is available in more than 100 countries. [Learn more](https://www.cisco.com/web/ciscocapital/americas/us/index.html).

**For More Information**

For more information about the Cisco 1900 Series, visit <https://www.cisco.com/go/1900> or contact your local Cisco account representative.