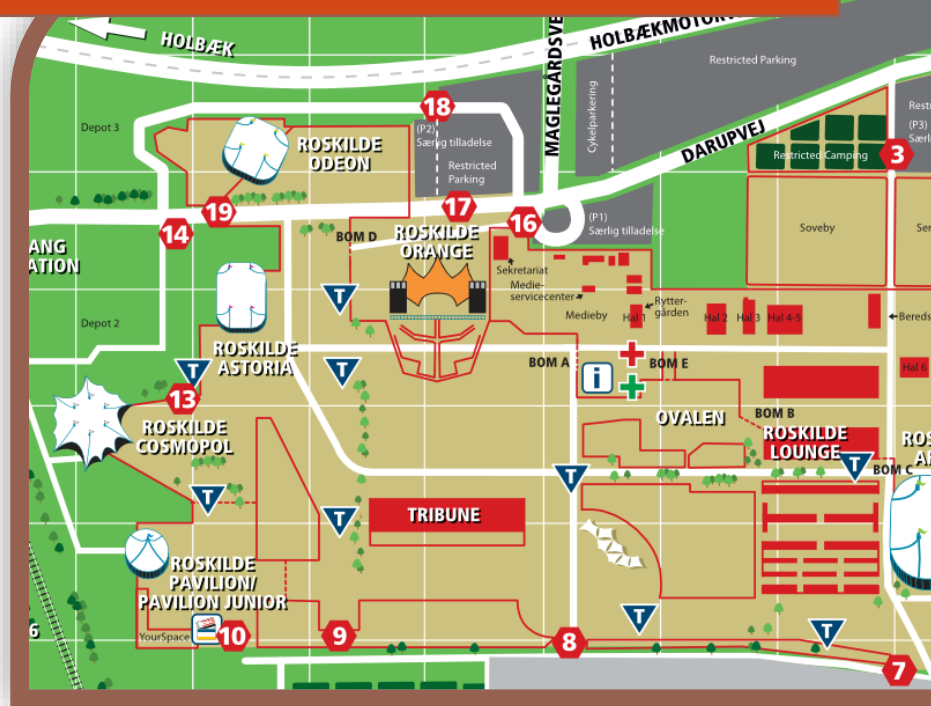


Roskilde Festival



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Bazal
AMRB
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Case

Vi har fået til opgave at udvide den tidligere løsning. Da ølteltene løbende indberetter deres salg til den centrale maskine ved punkt 16 stiller festivalen krav om at netværket ikke må bryde ned.

Design netværket så der er flere mulige veje for netværkstrafikken og så trafikken automatisk routes en anden vej hvis en forbindelse afbrydes af en glad festivaldeltager på afveje/gaffeltrucken med en frisk palle bajere til et øltelt.

Der er opstået behov for flere ip adresser til musikere.

Opdel adresse-rangen 193.18.10.0/24 således at der opnås tre subnet, hver med plads til 7 øl-salgsapperater, et andet subnet med plads til 15 admin maskiner, et tredje subnet med plads til 80 musikere og endelig har førstehjælpsteltet brug for et subnet med plads til 4 maskiner.

Festivalen har købt en ny storskærm der kræver IPv6 tilslutning. De har samtidigt stillet adressen 2001:DB8:ACDC::/48 til rådighed.

Opret subnets i IPv6 til admin, ølteltene, musikerne og førstehjælpsteltet og opsæt dine routere så de router IPv6.

Indholdsfortegnelse

Case	Fejl! Bogmærke er ikke defineret.
Indholdsfortegnelse.....	2
Beskrivelse af udstyr.....	3
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Diagram	4
Konklusion	Fejl! Bogmærke er ikke defineret.
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<i>Bilag 2</i>	<i>10</i>

Beskrivelse af udstyr

Der blev valgt Fire Cisco 1941 SEC K9 Router

se bilag 1 for specifikationer

Der er blevet brugt 10 switch med 24 porte (dog er der mulighed for udvidelse til 48 ports switch i det virkelige liv. (Der er kun 24 ports switch i Packet Tracer))



Specifikationer for Router bilag 1. For Switch bilag 2.

Netværket er delt op i 11 VLSM Subnets. Se tabellen nedenfor.

Der blev brugt følgende kabler 2 x 250 m. Seriel kabel, 2 x 350 m. Seriel kabel 2 x 450 m. Seriel kabel samt RJ45.

13 stk. RJ45 kabel kategori 5 med forskellige længder.

Koden til Routere og Telnets:

Adgangskode: Roskilde

Telnet Adgangskode: Roskilde



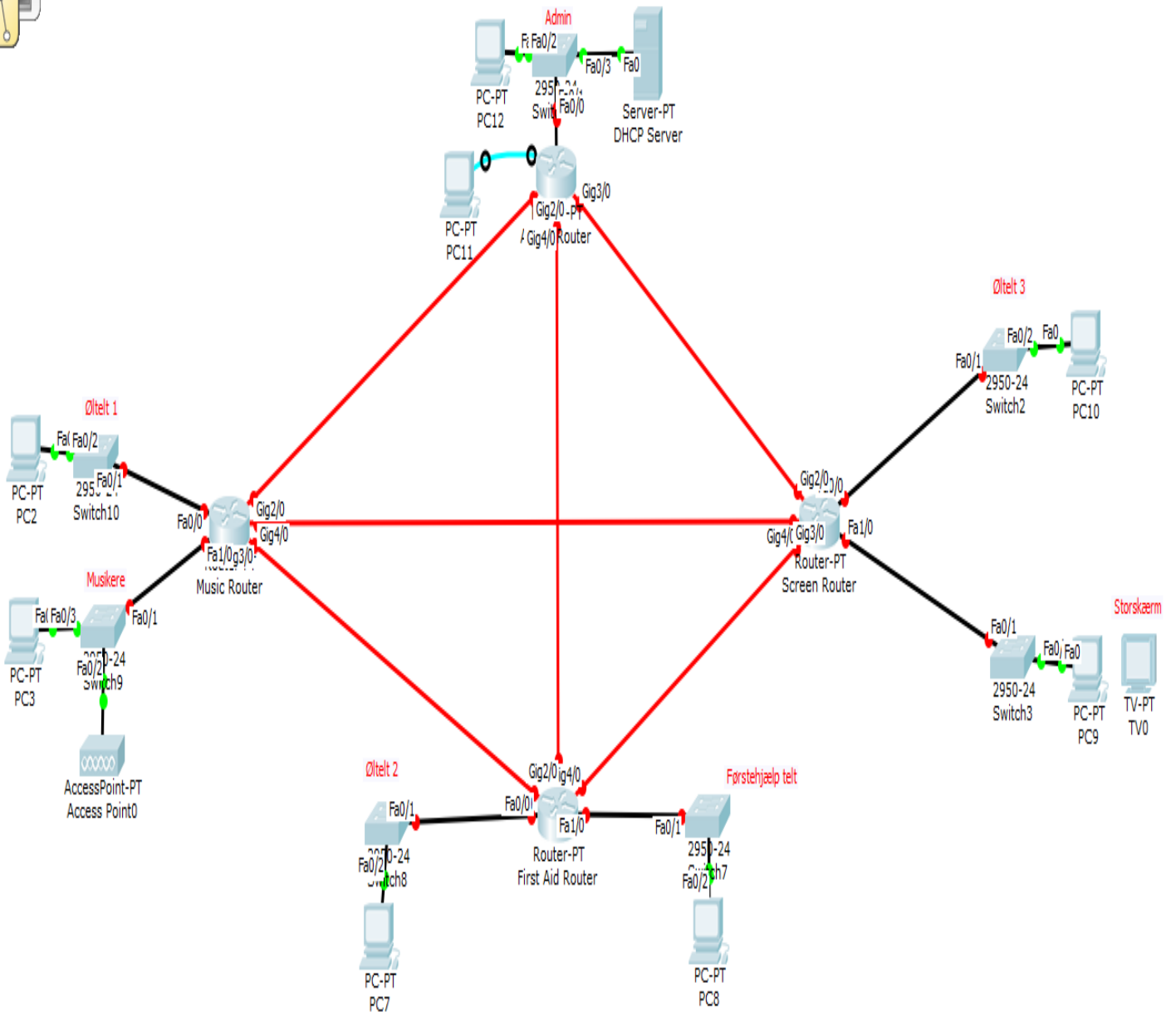
Netværket

Fuld Mesh Netværket bruger en klasse C netværk 193.18.10.0/24, den har vi delt op i VLSM subnet på følgende måde:

Router	Port	Gateway IPv4	Gateway IPv6	Dest Router	Dest Port	Clock
Admin Router	Gig0/0	193.18.10.129/27	2001:DB8:ACDC:1::1/64	Admin Switth	Fa0/1	
Admin Router	Gig0/1					
Admin Router	Se0/0/1	193.18.10.217/30	2001:DB8:ACDC:7::1/64	Music Router	Se0/0/1	*
Admin Router	Se0/1/0	193.18.10.221/30	2001:DB8:ACDC:8::1/64	Screen Router	Se0/1/0	*
Admin Router	Se/0/0/0	193.18.10.225/30	2001:DB8:ACDC:9::/64	First Aid Router	Se0/0/0	*
Screen Router	Gig0/1	193.18.10.161/28	2001:DB8:ACDC:2::/64	Beer Switth 3	Fa0/1	
Screen Router	Gig0/0		2001:DB8:ACDC:6::/64	Screen Switth	Fa0/1	
Screen Router	Se0/1/0	193.18.10.222/30	2001:DB8:ACDC:8::/64	Admin Router	Se0/1/0	
Screen Router	Se0/1/1	193.18.10.233/30	2001:DB8:ACDC:A::/64	Music Router	Se0/1/1	*
Screen Router	Se0/0/0	193.18.10.237/30	2001:DB8:ACDC:B::/64	First Aid Router	Se0/0/1	*
First Aid Router	Gig0/0	193.18.10.177/28	2001:DB8:ACDC:3::/64	Beer Switth 2	Fa0/1	
First Aid Router	Gig0/1	193.18.10.209/29	2001:DB8:ACDC:5::/64	First Aid Switth	Fa0/1	
First Aid Router	Se0/0/0	193.18.10.226/30	2001:DB8:ACDC:9::1/64	Admin Router	Se0/0/0	
First Aid Router	Se/0/1/0	193.18.10.229/30	2001:DB8:ACDC:C::/64	Music Router	Se0/0/0	*
First Aid Router	Se0/0/1	193.18.10.238/30	2001:DB8:ACDC:B::1/64	Screen Router	Se0/0/0	
Music Router	Gig0/0	193.18.10.193/28	2001:DB8:ACDC:4::/64	Beer Switth 1	Fa0/1	
Music Router	Gig0/1	193.18.10.1/25	2001:DB8:ACDC:0::/64	Music Switth	Fa0/1	
Music Router	Se0/0/1	193.18.10.218/30	2001:DB8:ACDC:7::/64	Admin Router	Se0/0/1	
Music Router	Se0/0/0	193.18.10.230/30	2001:DB8:ACDC:C::1/64	First Aid Router	Se0/1/0	

Music Router	Se0/1/1	193.18.10.234/30	2001:DB8:ACDC:A::1/64	Screen Router	Se0/1/1	
DHCP Server	Fa0	192.18.10.130/27	2001:DB8:ACDC:1::/64	Admin Switch	Fa0/3	

Diagram



Konklusion

Vi har her valgt at brug Fuld-Mesh Netværk med 4 Routere for at sikre stabiliteten og for at kunne klare opgaven til Festivalen.

Bilag 1

Cisco 1941 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

	Cisco1941, Cisco1941W
	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


	Cisco1941, Cisco1941W
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

	Cisco1941, Cisco1941W
	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	<ul style="list-style-type: none"> › 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	<ul style="list-style-type: none"> › 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	<ul style="list-style-type: none"> › 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	<ul style="list-style-type: none"> › 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	
Service Set Identifiers (SSIDs)	16
Wireless VLANs	16
Encrypted wireless VLANs	16
Multiple Broadcast Service Set Identifiers (MBSSIDs)	16

Bilag 2

Catalyst 2950 switch

Feature	Benefit
Availability	
Superior Redundancy for Fault Backup	<ul style="list-style-type: none"> • IEEE 802.1D Spanning Tree Protocol support for redundant backbone connections and loop-free networks simplifies network configuration and improves fault tolerance. • IEEE 802.1w Rapid Spanning- Tree Protocol (RSTP) provides rapid convergence of the spanning tree, independent of spanning-tree timers. • Per VLAN Rapid Spanning Tree (PVRST+) allows rapid spanning-tree reconvergence on a per-VLAN spanning-tree basis, without requiring the implementation of spanning-tree

	<p>instances.</p> <ul style="list-style-type: none"> • Support for Cisco Spanning Tree Protocol enhancements such as UplinkFast, BackboneFast, and PortFast technologies ensures quick failover recovery and enhances overall network stability and availability. • Support for Cisco's optional RPS 675, 675-watt redundant AC power system, which provides a backup power source for one of six switches, for improved fault tolerance and network uptime. • Unidirectional link detection (UDLD) and aggressive UDLD detect and disable unidirectional links on fiber-optic interfaces caused by incorrect fiber-optic wiring or port faults.
<p>Integrated Cisco IOS Software Features for Bandwidth Optimization</p>	<ul style="list-style-type: none"> • Bandwidth aggregation through Cisco EtherChannel technology enhances fault tolerance and offers higher-speed aggregated bandwidth between switches to routers and individual servers. Port Aggregation Protocol (PagP) is available to simplify configuration. • VLAN1 minimization allows VLAN1 to be disabled on any individual VLAN trunk link. • IEEE 802.1s Multiple Spanning Tree Protocol (MSTP) allows a spanning-tree instance per VLAN, enabling Layer 2 load sharing on redundant links. • Per-port broadcast, multicast, and unicast storm control prevents faulty end stations from degrading overall system performance. • Per VLAN Spanning Tree Plus (PVST+) allows for Layer 2 load sharing on redundant links to efficiently use the extra capacity inherent in a redundant design. • VLAN Trunking Protocol (VTP) pruning limits bandwidth consumption on VTP trunks by flooding broadcast traffic only on trunk links required to reach the destination devices. Dynamic Trunking Protocol (DTP) enables dynamic trunk configuration across all ports in the switch. • IGMPv3 snooping provides for fast client joins and leaves of multicast streams and limits bandwidth-intensive video traffic to the requestors. MVR, IGMP filtering, and fast-join and immediate leave are available as enhancements. IGMP Snooping time can be adjusted to optimize the performance of multicast data flows.
<p>Security</p>	
<p>Networkwide Security Features</p>	<ul style="list-style-type: none"> • A private VLAN edge provides security and isolation between ports on a switch, ensuring that voice traffic travels directly from its entry point to the aggregation device through a virtual path and cannot be directed to a different port. • Support for the 802.1x standard allows users to be authenticated regardless of which LAN ports they are accessing, and it provides unique benefits to customers who have a large base of mobile (wireless) users accessing the network. <ul style="list-style-type: none"> –802.1x with voice VLAN permits an IP phone access to the voice VLAN regardless of the authorized or unauthorized state of the port. –802.1x with Port Security authenticates the port and manages network access for all MAC addresses, including that of the client. –IEEE 802.1x with Guest VLAN allows guests without 802.1x clients to have limited network access on the Guest VLAN. –IEEE 802.1x with VLAN assignment allows a dynamic VLAN assignment for a specific user regardless of where the user is connected. • SSHv2 provides network security by encrypting administrator traffic during Telnet sessions. SSHv2 requires a special cryptographic software image due to US export restrictions • Port Security secures the access to a port based on the MAC address of a user's device. The aging feature removes the MAC address from the switch after a specific time to allow another device to connect to the same port. • MAC Address Notification allows administrators to be notified of new users added or removed from the network. • Multilevel security on console access prevents unauthorized users from altering the switch configuration. • Trusted Boundary provides the ability to trust the QoS priority settings if an IP phone is present and disable the trust setting in the event that the IP phone is removed, thereby preventing a rogue user from overriding prioritization policies in the network. • TACACS+ and RADIUS authentication enables centralized control of the switch and restricts

	<ul style="list-style-type: none"> unauthorized users from altering the configuration. SPAN support of Intrusion Detection Systems (IDSs) to monitor, repel, and report network security violations SNMPv3 (non-crypto) monitors and controls network devices, manages configurations, statistics collection, performance, and security. Cisco Network Assistant software security wizards ease the deployment of security features for restricting user access to a server, a portion of the network, or access to the network.
Quality of Service	
Layer 2 QoS	<ul style="list-style-type: none"> Support for reclassifying frames is based either on 802.1p class-of-service (CoS) value or default CoS value per port assigned by network manager. Four queues per egress port are supported in hardware. The Weighted Round Robin (WRR) scheduling algorithm ensures that low-priority queues are not starved. Strict priority queue configuration via Strict Priority Scheduling ensures that time-sensitive applications such as voice always follow an expedited path through the switch fabric.
Management	
Superior Manageability	<ul style="list-style-type: none"> SNMP and Telnet interface support delivers comprehensive in-band management, and a CLI management console provides detailed out-of-band management. An embedded Remote Monitoring (RMON) software agent supports four RMON groups (history, statistics, alarms, and events) for enhanced traffic management, monitoring, and analysis. A Switched Port Analyzer (SPAN) port can mirror traffic from one or many ports to another port for monitoring all nine RMON groups with an RMON probe or network analyzer. Trivial File Transfer Protocol (TFTP) reduces the cost of administering software upgrades by downloading from a centralized location. Network Timing Protocol (NTP) provides an accurate and consistent timestamp to all switches within the intranet. Layer 2 traceroute eases troubleshooting by identifying the physical path that a packet takes from the source device to a destination device. Multifunction LEDs per port for port status, half-duplex/full-duplex, 10BASE-T/100BASE-TX/1000BASE-T indication, as well as switch-level status LEDs for system, redundant power supply, and bandwidth utilization provide a comprehensive and convenient visual management system. Crash information support enables a switch to generate a crash file for improved troubleshooting. Show-interface-capabilities provide information about the configuration capabilities of any interface. Response Time Monitoring (RTTMON) MIB allows users to monitor network performance between a Cisco Catalyst switch and a remote device.
Cisco Network Assistant Software	<ul style="list-style-type: none"> Cisco Network Assistant Software is a free, standalone network management application software that simplifies the administration of networks of up to 250 users. It supports a wide range of Cisco Catalyst intelligent switches from Cisco Catalyst 2950 through Cisco Catalyst 4506. With Cisco Network Assistant, users can manage Cisco Catalyst switches plus launch the device managers of Cisco integrated services routers (ISRs) and Cisco Aironet WLAN access points by simply clicking on its icon in the topology map. Cisco AVVID (Architecture for Voice, Video and Integrated Data) wizards use just a few user inputs to automatically configure the switch to optimally handle different types of traffic: voice, video, multicast, and high-priority data. One-click software upgrades can be performed across the entire cluster simultaneously, and configuration cloning enables rapid deployment of networks. Cisco Network Assistant Guide Mode helps users configure powerful advanced features by providing step-by-step instructions. Cisco Network Assistant provides enhanced online help for context-sensitive assistance.

	<ul style="list-style-type: none"> • Easy-to-use graphical interface provides both a topology map and front-panel view of the switches. • Multidevice- and multiport-configuration capabilities allow network administrators to save time by configuring features across multiple switches and ports simultaneously. • User-personalized interface allows users to modify polling intervals, table views, and other settings within Cisco Network Assistant and retain these settings the next time they use Cisco Network Assistant. • Alarm notification provides automated e-mail notification of network errors and alarm thresholds.
<p>Support for CiscoWorks</p>	<ul style="list-style-type: none"> • Manageability is enabled through CiscoWorks network management software on a per-port and per-switch basis, providing a common management interface for Cisco routers, switches, and hubs. • SNMPv1, v2, and v3 (non-cryptographic) and Telnet interface support delivers comprehensive in-band management, and a command-line-interface (CLI) management console provides detailed out-of-band management. • Cisco Discovery Protocol (CDP) versions 1 and 2 enable a CiscoWorks network management station to automatically discover the switch in a network topology. • Support is provided by the CiscoWorks LAN Management Solution.
<p>Ease of Use and Deployment</p>	<ul style="list-style-type: none"> • Cisco Device Manager is an embedded web-based software that allows the customer to easily configure and troubleshoot the switch, eliminating the need for more complex terminal emulation programs and CLI knowledge, and reducing the cost of deployment by enabling less-skilled personnel to quickly and simply set up switches. • Cisco Express Setup allows the customer to quickly and easily initialize a switch with a web browser • Smartports offers a set of verified feature macros per connection type in an easy-to-apply manner. With these macros, users can consistently and reliably configure essential security, availability, quality of service, and manageability features recommended for Cisco Business Ready Campus solutions with minimal effort and expertise. • Auto-configuration eases deployment of switches in the network by automatically configuring multiple switches across a network using a bootp server. • Autosensing on each port detects the speed of the attached device and automatically configures the port for 10 or 100 Mbps operation, easing the deployment of the switch in mixed-speed environments. • Auto-negotiating on all ports automatically selects half- or full-duplex transmission mode to optimize bandwidth. • Link Aggregation Control Protocol (LACP) allows the creation of Ethernet channeling with devices that conform to IEEE 802.3ad. This is similar to Cisco EtherChannel and PagP. • Cisco Discovery Protocol versions 1 and 2 enable a CiscoWorks network management station to automatically discover the switch in a network topology. • Cisco VTP supports dynamic VLANs and dynamic trunk configuration across all switches. • Support for dynamic VLAN assignment through implementation of VLAN Membership Policy Server (VMPS) client functions provides flexibility in assigning ports to VLANs. • Voice VLAN simplifies telephony installations by keeping voice traffic on a separate VLAN for easier network administration and troubleshooting. • The default configuration stored in Flash memory ensures that the switch can be quickly connected to the network and can pass traffic with minimal user intervention.

PRODUCT SPECIFICATIONS

Feature	Description
<p>Performance</p>	<ul style="list-style-type: none"> • 13.6-Gbps switching fabric (Catalyst 2950T-48-SI and 2950SX-48-SI) • 8.8-Gbps switching fabric (Catalyst 2950SX-24, 2950-24, 2950-12) • Cisco Catalyst 2950-12: 2.4 Gbps maximum forwarding bandwidth • Cisco Catalyst 2950-24: 4.8 Gbps maximum forwarding bandwidth • Cisco Catalyst 2950SX-24: 8.8 Gbps maximum forwarding bandwidth

	<ul style="list-style-type: none"> • Cisco Catalyst 2950T-48: 13.6 Gbps maximum forwarding bandwidth • Cisco Catalyst 2950SX-48: 13.6 Gbps maximum forwarding bandwidth (Forwarding rates based on 64 byte packets) • Cisco Catalyst 2950-12: 1.8 Mpps wire-speed forwarding rate • Cisco Catalyst 2950-24: 3.6 Mpps wire-speed forwarding rate • Cisco Catalyst 2950SX-24: 6.6 Mpps wire-speed forwarding rate • Cisco Catalyst 2950T-48: 10.1 Mpps wire-speed forwarding rate • Cisco Catalyst 2950SX-48: 10.1 Mpps wire-speed forwarding rate • 8 MB packet buffer memory architecture shared by all ports • 16 MB DRAM and 8 MB Flash memory • Configurable up to 8000 MAC addresses
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Feature	Description/Part Numbers
Management	<ul style="list-style-type: none"> • BRIDGE-MIB • CISCO-2900-MIB • CISCO-BULK-FILE-MIB • CISCO-CDP-MIB • CISCO-CLASS-BASED-QOS-MIB • CISCO-CONFIG-COPY-MIB • CISCO-CONFIG-MAN-MIB • CISCO-ENVMON-MIB • CISCO-FLASH-MIB • CISCO-FTP-CLIENT-MIB • CISCO-IMAGE-MIB • CISCO-IPMROUTE-MIB • CISCO-MAC-NOTIFICATION-MIB • CISCO-MEMORY-POOL-MIB • CISCO-PAGP-MIB • CISCO-PING-MIB • CISCO-PORT-SECURITY-MIB • CISCO-PROCESS-MIB • CISCO-PRODUCTS-MIB • CISCO-RTTMON-MIB • CISCO-SMI • CISCO-STACKMAKER-MIB • CISCO-STP-EXTENSIONS-MIB • CISCO-SYSLOG-MIB • CISCO-TC • CISCO-TCP-MIB • CISCO-VLAN-MEMBERSHIP-MIB • CISCO-VTP-MIB • ENTITY-MIB • IANAifType-MIB • IF-MIB (RFC 1573) • OLD-CISCO-CHASSIS-MIB • OLD-CISCO-CPU-MIB • OLD-CISCO-INTERFACES-MIB • OLD-CISCO-IP-MIB • OLD-CISCO-MEMORY-MIB • OLD-CISCO-SYSTEM-MIB • OLD-CISCO-TCP-MIB

	<ul style="list-style-type: none"> • OLD-CISCO-TS-MIB • RFC1213-MIB (MIB-II) • RFC1398-MIB (ETHERNET-MIB) • RMON-MIB (RFC 1757) • RS-232-MIB • SNMPv2-MIB • SNMPv2-SMI • SNMPv2-TC • TCP-MIB • UDP-MIB
Standards	<ul style="list-style-type: none"> • IEEE 802.1x support • IEEE 802.3x full duplex on 10BASE-T and 100BASE-TX ports • IEEE 802.1D Spanning-Tree Protocol • IEEE 802.1p class-of-service (CoS) prioritization • IEEE 802.1Q VLAN • IEEE 802.1s • IEEE 802.1w • IEEE 802.3 10BASE-T specification • IEEE 802.3u 100BASE-TX specification • IEEE 802.3ad • IEEE 802.3z 1000BASE-X specification
Connectors and Cabling	<ul style="list-style-type: none"> • 10BASE-T ports: RJ-45 connectors, two-pair Category 3, 4, or 5 unshielded twisted-pair (UTP) cabling • 100BASE-TX ports: RJ-45 connectors; four-pair Category 5 UTP cabling • 1000BASE-SX ports: MT-RJ connectors, up to 1800 feet (550 meters) cable distance for 50/125 or up to 900 ft (275 m) cable distance for 62.5/125 micron multimode fiber-optic cabling • Management console port: 8-pin RJ-45 connector, RJ-45-to-DB9 adapter cable for PC connections; for terminal connections, use RJ-45-to-DB25 female data-terminal-equipment (DTE) adapter (can be ordered separately, Cisco part number ACS-DSBUASYN=)
MT-RJ Patch Cables for Cisco Catalyst 2950SX 24 Switch	<p>Type of cable, Cisco part number:</p> <ul style="list-style-type: none"> • 1-meter MT-RJ-to-SC multimode cable, CAB-MTRJ-SC-MM-1M • 3-meter MT-RJ-to-SC multimode cable, CAB-MTRJ-SC-MM-3M • 5-meter MT-RJ-to-SC multimode cable, CAB-MTRJ-SC-MM-5M • 1-meter MT-RJ-to-ST multimode cable, CAB-MTRJ-ST-MM-1M • 3-meter MT-RJ-to-ST multimode cable, CAB-MTRJ-ST-MM-3M • 5-meter MT-RJ-to-ST multimode cable, CAB-MTRJ-ST-MM-5M
Power Connectors	<p>Customers can provide power to a switch by using the internal power supply, the Cisco RPS 675 Redundant Power System. The connectors are located at the back of the switch.</p> <ul style="list-style-type: none"> • Internal power supply connector <ul style="list-style-type: none"> –The internal power supply is an auto-ranging unit. –The internal power supply supports input voltages between 100 and 240 VAC. –Use the supplied AC power cord to connect the AC power connector to an AC power outlet. • Cisco RPS 675 connector <ul style="list-style-type: none"> –The connector offers connection for an optional Cisco RPS 675 that uses AC input and supplies DC output to the switch. –The connector offers a 675W redundant power system that supports one of up to six external network devices and provides power to one failed device at a time. –The connector automatically senses when the internal power supply of a connected

	<p>device fails and provides power to the failed device, preventing loss of network traffic.</p> <p>–Attach only the Cisco RPS 675 (Model PWR675-AC-RPS-NI=) to the redundant power supply receptacle with this connector.</p>
Indicators	<ul style="list-style-type: none"> • Per-port status LEDs: link integrity, disabled, activity, speed, and full-duplex indications • System status LEDs: system, RPS, and bandwidth-utilization indications
Dimensions and Weight (H x W x D)	<ul style="list-style-type: none"> • 1.72 x 17.5 x 9.52 in. (4.36 x 44.45 x 24.18 cm) (Cisco Catalyst 2950SX-24, 2950-24, 2950-12) • 1.72 x 17.5 x 13 in. (4.36 x 44.45 x 33.02 cm) (Cisco Catalyst 2950SX-48, 2950T-48) • 1 RU high (1.72 in./4.36 cm) • 6.5 lb (3.0 kg) (Cisco Catalyst 2950SX-24, 2950-24, 2950-12) • 10.6 lb (4.8 kg) (Cisco Catalyst 2950SX-48, 2950T-48)
Environmental Ranges	<ul style="list-style-type: none"> • Operating temperature: 32 to 113°F (0 to 45°C) • Storage temperature: -13 to 158°F (-25 to 70°C) • Operating relative humidity: 10-85% (non-condensing) • Operating altitude: Up to 10,000 ft (3000 m) • Storage altitude: Up to 15,000 ft (4500 m)
Power Requirements	<ul style="list-style-type: none"> • Power consumption: 30W (maximum), 102 BTUs per hour (Cisco Catalyst 2950SX-24, 2950-24, 2950-12) • Power consumption: 45W (maximum), 154 BTUs per hour (Cisco Catalyst 2950T-48, 2950SX-48) • AC input voltage: 100 to 127, 200 to 240 VAC (auto-ranging) • AC input frequency: 47 to 63 Hz • DC input voltages for Cisco RPS 675 and Cisco RPS 300: +12V at 4.5A
Acoustic Noise	<p>ISO 7770, bystander position, operating to an ambient temperature of 86°F (30°C):</p> <ul style="list-style-type: none"> • WS-C2950-24, WS-C2950-12, WS-C2950SX-24: 46 dBA • WS-C2950T-48-SI, WS-C2950SX-48-SI: 48 dBA
Predicted Mean Time Between Failure	<ul style="list-style-type: none"> • 398,240 hours (Cisco Catalyst 2950-24) • 482,776 hours (Cisco Catalyst 2950-12) • 480,346 hours (Cisco Catalyst 2950SX-24) • 268,876 hours (Cisco Catalyst 2950T-48-SI) • 274,916 hours (Cisco Catalyst 2950SX-48-SI)
Regulatory Agency Approvals	
Safety Certifications	<ul style="list-style-type: none"> • UL 60950/CSA 22.2 No. 950 • IEC 60950/EN 60950 • AS/NZS 3260, TS001 • CE Marking
Electromagnetic Emissions Certifications	<ul style="list-style-type: none"> • FCC Part 15 Class A • EN 55022: 1998 (CISPR 22) Class A • EN 55022: 1998 (CISPR 22) • VCCI Class A • AS/NZS 3548 Class A • CE Marking • CNS 13438 Class A • CLEI Code • MIC
Warranty	<ul style="list-style-type: none"> • Lifetime limited warranty

SERVICE AND SUPPORT

The services and support programs described here are available as part of the Cisco Desktop Switching Service and Support solution and are available directly from Cisco Systems® and through resellers.

Service and Support	Features	Benefits
Advanced Services		
Total Implementation Solutions (TIS)-Available direct from Cisco Packaged Total Implementation Solutions (Packaged TIS)-Available through resellers	<ul style="list-style-type: none"> • Project management • Site survey, configuration deployment • Installation, test, and cutover • Training • Major moves, adds, changes • Design review and product staging 	<ul style="list-style-type: none"> • Supplements existing staff • Ensures that functions meet needs • Mitigates risk
Technical Support Services		
Cisco SMARTnet® services and Cisco SMARTnet Onsite services-Available direct from Cisco Packaged Cisco SMARTnet services-Available through resellers	<ul style="list-style-type: none"> • Around-the-clock access to software updates • Web access to technical repositories • Telephone support through the Technical Assistance Center • Advance replacement of hardware parts 	<ul style="list-style-type: none"> • Enables proactive or expedited issue resolution • Lowers cost of ownership by using Cisco expertise and knowledge • Minimizes network downtime

ORDERING INFORMATION

Model Numbers	Configuration
WS-C2950-12	<ul style="list-style-type: none"> • 12 10/100 Mbps ports • 1-RU standalone, fixed-configuration, managed 10/100 Mbps switch • Standard Image (SI) Software
WS-C2950-24	<ul style="list-style-type: none"> • 24 10/100 Mbps ports • 1-RU standalone, fixed-configuration, managed 10/100 Mbps switch • Standard Image (SI) Software
WS-C2950SX-24	<ul style="list-style-type: none"> • 24 10/100 Mbps ports with two fixed 1000BASE-SX uplinks • 1-RU standalone, fixed-configuration, managed 10/100 Mbps switch • Standard Image (SI) Software
WS-C2950T-48-SI	<ul style="list-style-type: none"> • 48 10/100 Mbps ports with two fixed 10/100/1000BASE-T uplinks • 1-RU standalone, fixed-configuration, managed 10/100 Mbps switch • Standard Image (SI) Software
WS-C2950SX-48-SI	<ul style="list-style-type: none"> • 48 10/100 Mbps ports with two fixed 1000BASE-SX uplinks • 1-RU standalone, fixed-configuration, managed 10/100 Mbps switch • Standard Image (SI) Software