

Cisco Catalyst **3550** Series

Intelligent Ethernet Switches for Metro Access

Product Overview

The Cisco Catalyst® 3550 Series Intelligent Ethernet switches is a line of powerful, fixed-configuration multilayer switches that extend intelligence to the metro access edge, enabling service breadth, availability, security, and manageability. Key components of the Cisco Metro Ethernet Switching portfolio, these switches are ideal for service providers looking to deliver profitable Ethernet services while minimizing total cost of ownership. With a range of Fast Ethernet, Gigabit Ethernet, DC power, and fiber configurations, the Cisco Catalyst 3550 Series is the ideal metro access switch for enterprise and small and medium-sized business markets. Featuring 802.1Q tunneling, high-performance IP routing, and subsecond Spanning-Tree Protocol (STP) convergence, this line of powerful, yet cost-effective, fixed-configuration switches enable a variety of metro services, such as transparent LAN services and business-class Internet access.

The Cisco Catalyst 3550 Series Intelligent Ethernet switches include the following configurations:

- Cisco Catalyst 3550-24 Switch—24 10/100 ports and 2 Gigabit Interface Converter (GBIC)-based Gigabit Ethernet ports; 1 rack unit (RU)
- Cisco Catalyst 3550-24-DC Switch—24 10/100 ports and 2 gigabit interface converter (GBIC)-based Gigabit Ethernet ports; 1 RU DC-powered

- Cisco Catalyst 3550-24-FX Switch—24 100FX multimode fiber ports and 2 GBIC-based Gigabit Ethernet ports; 1 RU
- Cisco Catalyst 3550-48 Switch—48 10/100 ports and 2 GBIC-based Gigabit Ethernet ports; 1 RU
- Cisco Catalyst 3550-12G Switch—10 GBIC-based Gigabit Ethernet ports and 2 10/100/1000BaseT ports; 1.5 RU
- Cisco Catalyst 3550-12T Switch—10 10/100/1000BaseT ports and 2 GBIC-based Gigabit Ethernet ports; 1.5 RU

The built-in Gigabit Ethernet ports accommodate a range of GBIC transceivers, including the Cisco Course Wave Division Multiplexing (CWDM) GBIC Solution, GigaStack® GBIC, 1000BaseT, 1000BaseSX, 1000BaseLX/LH, and 1000BaseZX GBICs. High levels of resiliency can also be implemented by deploying dual redundant Gigabit Ethernet uplinks, UplinkFast and Per-VLAN Spanning Tree Plus (PVST+) for uplink load balancing. This Gigabit Ethernet flexibility makes the Cisco Catalyst 3550 Series switches an ideal metro access edge complement to the Cisco 7600 Series Internet Router and Cisco Catalyst 6500 Series of metro Ethernet switches.



Included with the Cisco Catalyst 3550-24, 3550-24-DC, 3550-24-FX and 3550-48 are the Standard Multilayer Software Image (SMI) or the Enhanced Multilayer Software Image (EMI). The SMI feature set includes advanced QoS, rate-limiting, access control lists (ACLs), and basic state and RIP routing functionality. The EMI provides a richer set of features including advanced hardware-based IP unicast and multicast routing and the Web Cache Communication Protocol (WCCP). After initial deployment, the Enhanced Multilayer Software Image Upgrade Kit gives users the flexibility to upgrade to the EMI. The Cisco Catalyst 3550-12T and 3550-12G are only available with the EMI.

Figure 1

Cisco Catalyst 3550-24 Intelligent Ethernet Switch



Figure 2

Cisco Catalyst 3550-24-DC Intelligent Ethernet Switch



Figure 3

Cisco Catalyst 3550-24-FX Intelligent Ethernet Switch



Figure 4

Cisco Catalyst 3550-48 Intelligent Ethernet Switch





Figure 5

Cisco Catalyst 3550-12G and 3550-12T Intelligent Ethernet Switches



Intelligence at the Metro Access Edge: Enabling Profitable Ethernet Services

Service providers are facing significant challenges in meeting the service needs of their enterprise and small and medium-sized business (SMB) market customers. As they continue to put more and more mission-critical applications on their networks, these customers are demanding high bandwidth at speeds greater than T1/E1 and at competitive prices. Enterprise and SMB customers have experienced the speed and cost benefits of Ethernet in their LANs and want to extend these benefits into the wide-area and metro-area networks (WAN and MAN). However, in today's economic environment, service providers face several challenges as they look to meet the service needs of their customers. Such challenges include:

- Providing profitable new services while reducing operational and capital costs
- Meeting variable bandwidth demand at speeds greater than T1/E1
- Effectively integrating existing WAN services such as Frame Relay and Asynchronous Transfer Mode (ATM)
- Building cost-effective, highly available, scalable metro Ethernet networks

These challenges are especially evident at the metro access edge. As service providers look to provide profitable Ethernet services such as Layer 2 virtual private networks (Layer 2 VPNs) or business Internet access, Cisco intelligent functionality such as 802.1Q tunneling, advanced quality of service (QoS), and granular rate-limiting, is essential in the service provider's customer located equipment. In addition, with intelligent features such as subsecond STP convergence and CWDM GBIC support, Cisco Catalyst 3550 Series switches provide the necessary network availability and scalability at the access edge. With Cisco Catalyst 3550 Series Intelligent Ethernet switches, Cisco delivers the optimal balance of performance, cost-effectiveness, and intelligence, enabling profitable Ethernet service breadth, availability, security, and manageability.

Most important, the Cisco Catalyst 3550 Series is a key component of the Cisco Metro Ethernet Switching portfolio. For regional metro, metro aggregation and metro access, Cisco Metro Ethernet Switching enables service providers to deliver profitable, comprehensive Ethernet services. With the effective integration of existing WAN services, such as Frame Relay and ATM, Cisco Metro Ethernet Switching offers an unmatched breadth of service delivery mechanisms. With its extensive automated operations support, Cisco also helps service providers minimize total cost of ownership for new services. Through technology leadership, financial stability, and a commitment to customer support, Cisco ensures service success from "start-to-scale."

Service Breadth through 802.1Q Tunneling, Advanced Quality of Service, and Rate-limiting

The Cisco Catalyst 3550, with its 802.1Q tunneling capability, enables service providers to create Layer 2 transparent LAN services (TLS) with a clear separation of their network from enterprise and SMB customer networks. Using a 802.1Q tunneling implementation, service provider VLAN information (802.1Q tag) is added to the customer's original 802.1Q-tagged packets as the packets come into the service provider network. The service provider 802.1Q



tag is removed when the packets exit their network, leaving the original packets untouched. Other Layer 2 protocols such as STP, VLAN Trunk Protocol (VTP), and Cisco Discovery Protocol will also be tunneled through the service provider's network. The 802.1Q tunneling feature enables service providers to use a single VLAN (up to 4096 VLAN IDs) to support customers who have multiple VLANs. In addition, the feature preserves customers' original VLAN IDs and segregates traffic from different customers within the service provider infrastructure even when those customers use the same VLAN IDs. As a result, enterprise customers subscribing to TLS can transparently send and receive traffic from other metro sites through the service provider network as though the sites were within the same corporate LAN.

In addition to Layer 2 VPN services, Multi-VRF CE (Virtual Routing Forwarding Customer Edge, also called VRF-lite) and Border Gateway Protocol (BGP) on the Cisco Catalyst 3550 will enable the creation of a Layer 3 VPN service by keeping separate routing tables for each VPN customer. Multi-VRF CE is a feature that allows a service provider to support two or more VPNs on a single 3550 switch, where IP addresses can be overlapped among the VPNs. Multi-VRF CE uses input interfaces to distinguish routes for different VPNs and forms virtual packet-forwarding tables by associating one or more Layer 3 interfaces with each VRF. Interfaces in a VRF can be either physical, such as Ethernet ports, or logical, such as VLAN SVIs, but an interface cannot belong to more than one VRF at any time.

The Cisco Catalyst 3550 offers superior Layer 3 granular QoS features to enable service providers to provide high-quality services with service-level agreements (SLAs). The QoS features ensure that network traffic is classified, prioritized, and congestion is avoided in the most efficient manner possible. The Cisco Catalyst 3550 can classify, reclassify, police, and mark the incoming packets before the packet is placed in the shared buffer. Packet classification allows the network elements to discriminate between various traffic flows and enforce policies based on Layer 2 and Layer 3 QoS fields.

To implement QoS, first, the Cisco Catalyst 3550 switches identify traffic flows, or packet groups, and classify or reclassify these groups using either the Differentiated Services Code Point (DSCP) field or the 802.1p class-of-service (CoS) field, or both. Classification and reclassification can be based on criteria as specific as the source/destination IP address, source/destination Media Access Control (MAC) address, or the Layer 4 Transmission Control Protocol/ User Datagram Protocol (TCP/UDP) port. At the ingress, the Cisco Catalyst 3550 can also perform policing and marking of the packet. To ensure proper policing and marking on a per packet basis, control plane and data plane access control lists (ACLs) are supported on all ports.

After the packet goes through classification, policing, and marking, it is assigned to the appropriate queue before exiting the switch. The Cisco Catalyst 3550 Series supports four egress queues per port, which allows the service provider to be more discriminating and specific in assigning priorities for the various applications. At egress, the switch performs scheduling and congestion control. Scheduling is an algorithm that determines the order in which the queues are processed. The switches support Weighted Round Robin (WRR) scheduling and strict priority queuing. The WRR queuing algorithm ensures that the lower-priority packets are not entirely starved for bandwidth and are serviced without compromising the priority settings administered by the service provider. Strict priority queuing ensures that the highest-priority packets will always get serviced first, ahead of all other traffic, which allows the other three queues to be serviced using WRR scheduling. In conjunction with scheduling, the Cisco Catalyst 3550 Series Gigabit Ethernet ports support congestion control via Weighted Random Early Detection (WRED). WRED avoids congestion by setting thresholds at which packets are dropped before congestion occurs.



The Cisco Catalyst 3550 is capable of performing rate limiting via its support of the Cisco Committed Information Rate (CIR) functionality. Through CIR, bandwidth can be guaranteed in increments as low as 8 Kbps. Bandwidth can be allocated based on several criteria, including MAC source address, MAC destination address, IP source address, IP destination address, and TCP/UDP port number. Per-VLAN, per-port policing on the ingress is also supported. Each Cisco Catalyst 3550 Series 10/100 port supports eight aggregate or individual ingress policers and eight aggregate egress policers. Each Cisco Catalyst 3550 Series Gigabit Ethernet port supports 128 aggregate or individual ingress policers and 8 aggregate egress policers. This gives service providers the flexibility to offer more granular services.

In addition, the Cisco Catalyst 3550 Series also supports hardware-based high-performance IP routing, such as Open Shortest Path First (OSPF); Interior Gateway Routing Protocol (IGRP); Enhanced IGRP (EIGRP); Border Gateway Protocol (BGP); Routing Information Protocol (RIP) and RIP v2; Protocol-Independent Multicast (PIM); and hardware-based IGMP snooping for multicast applications. For voice over IP (VoIP), the Cisco Catalyst 3550 Series supports Auxiliary VLAN. Together with the superior QoS and rate-limiting features mentioned above, service providers can build a flexible network with the Cisco Catalyst 3550 Series to provide voice, video, and high-speed data services from a single network architecture.

Service Availability through Resiliency Enhancements and Network Redundancy

The Cisco Catalyst 3550 Series provides a rich set of resiliency enhancement features to ensure quick fail-over recovery and create a high-availability network. The IEEE 802.1w Rapid Spanning Tree standard allows the service provider to achieve subsecond spanning tree convergence times to maximize network stability and reliability. The IEEE 802.1s Multiple Spanning Tree standard can be deployed in conjunction with 802.1w to improve the scalability of the STP by grouping VLANs into spanning tree instances, as well as by providing backward compatibility to devices running the 802.1D STP.

In addition, service providers can enable Bridge Protocol Data Unit (BPDU) guard and Spanning Tree Root Guard (STRG) to enhance the reliability of their networks. BPDU guard allows the service provider to shut down STP PortFast-enabled interfaces to avoid receiving BPDUs from their customers' networks. STRG prevents customer devices outside the service provider's network from becoming STP root nodes.

The Cisco Catalyst 3550 Series enables the service provider to construct a highly redundant network. Per-VLAN Spanning Tree Plus (PVST+) allows the service provider to implement Layer 2 load-sharing on redundant links, efficiently utilizing the extra capacity inherent in a redundant design. For a Layer 3 network, Cisco Hot Standby Router Protocol (HSRP) creates redundant fail-safe routing topologies, and equal-cost routing provides Layer 3 load-balancing and redundancy. Service providers can also utilize EtherChannel® technology to aggregate up to 16 Gbps through Gigabit EtherChannel and up to 1.6 Gbps through Fast EtherChannel. The EtherChannel technology enhances fault tolerance and offers higher speed aggregated bandwidth between switches and to routers.

In addition to resiliency and network redundancy advantages, the Cisco Catalyst 3550 Series enables metro network scalability at the access edge through its support of the Cisco CWDM GBIC Solution. This solution allows service providers to scale their bandwidth without deploying additional fiber. The service provider can scale up to eight Gigabits of bandwidth on a pair of single-mode fibers at distances up to 120 km. With the support for CWDM GBICs on the Cisco Catalyst 3550 Series, service providers can aggregate multiple Cisco Catalyst 3550 switches to easily upgrade network bandwidth with existing fiber infrastructure.



Metro network scalability is also enhanced by the Cisco Catalyst 3550 Series support of 4,096 VLAN IDs and 1,005 active VLANs per switch. VLAN trunks can be created from any port using the standards-based 802.1Q or the Cisco Inter-Switch Link (ISL) VLAN trunking architecture.

Service Security through Access Control Lists and Enhanced Security Features

The Cisco Catalyst 3550 Series offers enhanced data security through the use of access control lists (ACLs). By denying packets based on source and destination MAC addresses, IP addresses, or TCP/UDP ports, users can be restricted from sensitive portions of the network. Also, because all ACL lookups are done in hardware, forwarding and routing performance is not compromised when implementing ACL-based security in the network. For superior security management, the Cisco Catalyst 3550 Series supports standard and extended ACLs on VLANs, Layer 3 interfaces, as well as Layer 2 interfaces.

Service providers can also implement higher levels of security by enabling private VLAN edge. This feature provides security and isolation between ports on a switch, ensuring that traffic travels directly from its entry point to the aggregation device through a virtual path and cannot be directed to a different port. Local Proxy Address Resolution Protocol (ARP) works in conjunction with private VLAN edge to minimize broadcasts and maximize available bandwidth.

With the Cisco Catalyst 3550 Series, service providers can implement high levels of console security. Multilevel access security on the switch console and the Web-based management interface prevents unauthorized users from accessing or altering switch configuration. Terminal Access Controller Access Control System (TACACS+) and Remote Authentication Dial-In User Service (RADIUS) authentication enable centralized access control of the switch and restricts unauthorized users from altering the configuration.

Service providers are also able to enhance their network security by adding 802.1x port-based authentication for authenticating individual customers, DHCP Interface Tracker (Option 82) for relaying customer identification (switch and port ID) to a DHCP server, and port security with MAC address aging for limiting the concurrent MAC addresses allowed per port.

Service Management through IE 2100 and SNMP

The Cisco Catalyst 3550 Series provides outstanding service management capabilities via Cisco IE 2100 Series Intelligence Engine support and SNMP. Service providers will be able to integrate the Cisco Catalyst 3550 Series seamlessly into their operations support systems (OSSs) and enable improved flow-through provisioning.

The Cisco IE 2100 Series network device allows service providers to effectively manage a network of Cisco IOS® Software devices, including the Cisco Catalyst 3550 Series. It is a completely self-contained unit that includes a task-oriented Web graphic user interface (GUI), a programmable extensible markup language (XML) interface, configuration template management, and an embedded repository. Network operators can use the Web GUI to quickly turn existing Cisco IOS CLI configuration files into reusable templates. The Cisco IE 2100 Series integrates easily into existing customer OSSs or business support systems (BSSs) and provisioning systems via its external repository support and the event-based Cisco IOS XML interface that effectively “workflow-enables” Cisco device deployment.

Service providers also can manage the Cisco Catalyst 3550 Series using Simple Network Management Protocol (SNMP) version 2 and version 3, and the Telnet interface for comprehensive in-band management. A CLI-based management console provides detailed out-of-band management.



A comprehensive set of Management Information Bases (MIBs) is provided for the service provider to collect traffic information on the Cisco Catalyst 3550 Series for various billing methods.

Product Features and Benefits

Feature	Benefit
Service Breadth	
Layer 2 and Layer 3 VPN services	• 802.1Q tunneling expands VLAN space by using a VLAN-in-VLAN hierarchy, and tagging the tagged packets. The 802.1Q tunneling feature enables service providers to use a single VLAN to support customers who have multiple VLANs, while preserving customer VLAN IDs and segregating traffic from different customers within the service provider infrastructure even when they appear to be on the same VLAN. • Multi-VRF CE (VRF-lite) forms virtual packet-forwarding tables by associating one or more Layer 3 interfaces with each VRF, allowing the creation of multiple Layer 3 VPNs on a single Cisco Catalyst 3550 Series. Interfaces in a VRF could be either physical, as in an Ethernet port, or logical, as in a VLAN switch virtual interface (SVI)—requires Enhanced Multilayer Software Image (EMI).
Voice and video services	• Protocol-Independent Multicast (PIM) for IP multicast routing within a network enables the network to receive the multicast feed requested and allows switches not participating in the multicast to be pruned—support for PIM sparse mode (PIM-SM), PIM dense mode (PIM-DM), and PIM sparse-dense mode—requires Enhanced Multilayer Software Image (EMI). • Distance Vector Multicast Routing Protocol (DVMRP) tunneling for interconnecting two multicast-enabled networks across non-multicast networks—requires Enhanced Multilayer Software Image (EMI). • IGMP filtering provides control of the set of multicast groups to which a user on a switch port can belong. • Voice VLAN (auxiliary VLAN) support for VoIP application allows the creation of data and voice VLANs on the same physical port. • Cisco Group Management Protocol (CGMP) server functionality enables a switch to serve as the CGMP router for CGMP client switches—requires Enhanced Multilayer Software Image (EMI). • IGMP snooping allows fast client “joins” and “leaves” of multicast streams and limits bandwidth-intensive video traffic to the requestors. • Web Cache Communication Protocol (WCCP) enables integration of cache engines into the network infrastructure. The cache engines transparently store frequently accessed content and then locally fulfill successive requests for the same content, eliminating repetitive transmissions of identical content to web servers. Cache engines accelerate content delivery and ensure maximum scalability and availability of content. In a service-provider network, WCCP and cache engine solution can be deployed at the points of presence (POPs)—requires Enhanced Multilayer Software Image (EMI).



Feature	Benefit
Advanced QoS	• 802.1p CoS and DSCP field classification via marking and reclassification on a per-packet basis using source/destination IP address, source/destination MAC address, or Layer 4 TCP/UDP port number. • Cisco control-plane and data-plane QoS ACLs on all ports to ensure proper marking on a per-packet basis. • Four egress queues per port supported in hardware to enable differentiated management of up to four types of traffic. • Weighted Round Robin (WRR) scheduling to ensure differential prioritization of packet flows by intelligently servicing the egress queues. • Weighted Random Early Detection (WRED) on all Gigabit Ethernet ports for avoidance of congestion at the egress queues before a disruption occurs. • Strict priority queuing to guarantee that the highest-priority packets will always get serviced ahead of all other traffic. • No performance penalty for highly granular QoS functionality.
Granular rate-limiting	• Cisco Committed Information Rate (CIR) functionality allows bandwidth to be guaranteed in increments as low as 8 Kbps. • Rate-limiting based on source/destination IP address, source/destination MAC address, or Layer 4 TCP/UDP information—or any combination of these fields—using QoS ACLs (IP ACLs or MAC ACLs), class maps, policy maps and per VLAN per port. • Ability to easily manage data-flows asynchronously both upstream and downstream from the end-station or on the uplink via ingress and egress policing. • Eight aggregate or individual ingress policers and eight aggregate egress policers on each 10/100 port. • 128 aggregate or individual ingress policers and eight aggregate egress policers on each Gigabit Ethernet port.
High-performance IP routing Except static routing, RIPv1, and RIPv2, all other IP routing features require the Enhanced Multilayer Software Image (EMI)	• Cisco Express Forwarding-based routing architecture performed in hardware to deliver extremely high-performance IP routing. • Support for all commonly deployed and industry standard IP unicast routing protocols (RIPv1, RIPv2, OSPF, IGRP, EIGRP) for load balancing and constructing scalable LANs. • Static IP routing for manually building a routing table of network path information. • Exterior BGP (eBGP) support to exchange route information between routers from different autonomous systems. Interior BGP (iBGP) is supported to exchange routes between the routers within the same autonomous systems. • Inter-VLAN IP routing for full Layer 3 routing between two or more VLANs. • Equal-cost routing for load balancing and redundancy. • Fallback bridging for forwarding of non-IP traffic between two or more VLANs. • Cisco HSRP to create redundant fail-safe routing topologies.



Feature	Benefit
Resiliency and reliability	• IEEE 802.1w Rapid Spanning Tree (RSTP) takes advantage of point-to-point wiring and provides rapid convergence of the spanning tree independent of spanning-tree timers. Reconfiguration of the spanning tree can occur in less than one second, which is critical for metro networks carrying mission-critical and delay-sensitive traffic such as enterprise data, voice, and video. • IEEE 802.1s Multiple Spanning Tree (MSTP), which uses RSTP for rapid convergence, enables VLANs to be grouped into a spanning-tree instance, with each instance having a spanning-tree topology independent of other spanning-tree instances. This architecture provides for multiple forwarding paths for data traffic, enables load balancing, and reduces the number of spanning-tree instances required to support a large number of VLANs. • Cisco UplinkFast/BackboneFast technologies ensure quick failover recovery, enhancing overall network stability and reliability. • Cisco CrossStack UplinkFast (CSUF) technology provides increased redundancy and network resiliency through fast spanning-tree convergence (fewer than two seconds) across a stack of switches using GigaStack GBICs in an independent stack backplane cascaded configuration. • Redundant stacking connections provide support for a redundant loopback connection for top and bottom switches in an independent stack backplane cascaded configuration. • Bridge protocol data unit (BPDU) guard shuts down Spanning-Tree Protocol PortFast-enabled interfaces when BPDUs are received to avoid accidental spanning-tree topology changes. • Spanning-tree root guard prevents edge devices outside the network administrator's control from becoming STP root nodes. • Command switch redundancy enabled in the Cisco Cluster Management Suite (CMS) Software allows customers to designate a backup command switch that takes over cluster management functions if the primary command switch fails. • Unidirectional link detection (UDLD) detects and disables unidirectional links on fiber-optic interfaces caused by incorrect fiber-optic wiring or port faults. Aggressive UDLD allows precautionary disabling of port on bidirectional links. • Per-port broadcast, multicast, and unicast storm control prevents faulty end-stations from degrading overall systems performance. • Support for (Redundant Power System) 300 (RPS 300) that provides superior internal power source redundancy for up to six Cisco networking devices resulting in improved fault tolerance and network uptime.
Redundancy	• Bandwidth aggregation of up to 16 Gbps through Cisco Gigabit EtherChannel technology and up to 1.6 Gbps through Cisco Fast EtherChannel technology enhances fault tolerance and offers higher-speed aggregated bandwidth between switches, to routers and individual servers. • Supports Cisco HSRP to create redundant failsafe routing topologies. • IEEE 802.1D Spanning Tree Protocol support for redundant backbone connections and loop-free networks simplifies network configuration and improves fault tolerance.



Feature	Benefit
	• 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. • Equal-cost routing for Layer 3 load-balancing and redundancy. • Local Proxy ARP works in conjunction with private VLAN edge to minimize broadcasts and maximize available bandwidth. • 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. • Internet Group Management Protocol (IGMP) snooping provides for fast client “joins” and “leaves” of multicast streams and limits bandwidth-intensive video traffic to only the requestors. • Multicast VLAN registration (MVR) continuously sends multicast streams in a multicast VLAN while isolating the streams from subscriber VLANs for bandwidth and security reasons.
Scalability	• The Cisco CWDM GBIC solution support allows for the scaling of bandwidth without deploying additional fiber. It provides scalability of up to eight Gigabits of bandwidth on a pair of single-mode fibers to reach the distances up to 100–120 km. • Support for up to 4,096 VLAN Ids with 1,005 active VLANs per switch; and up to 128 spanning tree instances per switch. • VLAN trunks can be created from any port using either standards-based 802.1Q tagging or the Cisco ISL VLAN architecture.
Network-wide security features	• IEEE 802.1x for dynamic port-based security. • Cisco security VLAN ACLs (VACLs) on all VLANs to prevent unauthorized data flows to be bridged within VLANs. • Cisco standard and extended IP security Router ACLs (RACLs) for defining security policies on routed interfaces for control plane and data plane traffic. • Port-based ACLs for Layer 2 interfaces allows security policy to be applied on per-Layer 2 port basis. • Time-based ACLs allow the implementation of security settings during specific periods of the day. • 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. • TACACS+ and RADIUS authentication to enable centralized control of the switch and restrict unauthorized users from altering the configuration. • Port security secures the access to a port based on the MAC address of a user’s device and prevents unauthorized stations from accessing the switch. The aging feature provides the capability to limit the number of concurrent devices per port. • Multilevel security on console access prevents unauthorized users from altering the switch configuration.



Feature	Benefit
	• SSH and SNMPv3 provides network security by encrypting administrator traffic during Telnet and SNMP sessions. SSH and the crypto version of SNMPv3 require a special crypto software image due to US export restrictions. • The user-selectable address-learning mode simplifies configuration and enhances security. • DHCP Interface Tracker (Option 82) enables the DHCP relay agent (Cisco Catalyst 3550 Series Switch) to include information about itself and the attached client when forwarding DHCP requests from a DHCP client to a DHCP server.
Superior manageability	• Cisco IE 2100 Series support for flow-through provisioning and integration with OSS applications via programmable interfaces. • Simple Network Management Protocol (SNMP) v1, v2c, and v3, and Telnet interface support delivers comprehensive in-band management, and a command-line interface (CLI)-based management console provides detailed out-of-band management. • Manageable through CiscoWorks network management software on a per-port and per-switch basis providing a common management interface for Cisco routers, switches, and hubs. • Cisco IOS CLI support provides common user interface and command set with all Cisco routers and Cisco desktop switches. • Comprehensive MIBs provided for the service provider to collect traffic information on Cisco Catalyst 3550 Series for various billing methods. • Supported by the Cisco Quality Policy Manager (QPM) solution for end-to-end QoS policies • Support for dynamic VLAN assignment through implementation of VLAN Membership Policy Server (VMPS) client functionality provides flexibility in assigning ports to VLANs. Dynamic VLAN enables fast assignment of IP address. • Supported by the CiscoWorks 2000 LAN Management Solution. • Supported by the Cisco Service Assurance (SA) Agent to facilitate service level management throughout the LAN. • Built-in Web-based Cisco Cluster Management Suite (CMS) Software provides an easy-to-use Web-based management interface through a standard Web browser. • Switch Database Manager templates for access, routing, and VLAN deployment scenarios allow the network administrator to easily maximize memory allocation to the desired features based on deployment-specific requirements. • Embedded Remote Monitoring (RMON) software agent supports four RMON groups (history, statistics, alarms, and events) for enhanced traffic management, monitoring, and analysis. • Support for all nine RMON groups through use of a Switch Port Analyzer (SPAN) port, which permits traffic monitoring of a single port, a group of ports, or the entire switch from a single network analyzer or RMON probe.



Feature	Benefit
	• RSPAN (Remote SPAN) allows network administrators to remotely monitor ports in a Layer 2 switch network from any other switch in the same network. • Domain Name Services (DNS) provide IP address resolution with user-defined device names. • 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. • Multifunction LEDs per port for port status, half-duplex/full-duplex, 10BaseT/100BaseTX/1000BaseT indication, as well as switch-level status LEDs for system, redundant power supply, and bandwidth utilization provide a comprehensive and convenient visual management system.

Product Specifications

Feature	Description
Performance	• 24 Gbps switching fabric (Cisco Catalyst 3550-12G and Cisco Catalyst 3550-12T), 13.6 Gbps switching fabric (Cisco Catalyst 3550-48), 8.8 Gbps switching fabric (Cisco Catalyst 3550-24, Cisco Catalyst 3550-24-DC, and Cisco Catalyst 3550-24-FX) • 12 Gbps maximum forwarding bandwidth at Layer 2 and Layer 3 (Cisco Catalyst 3550-12G and Cisco Catalyst 3550-12T), 6.8 Gbps maximum forwarding bandwidth at Layer 2 and Layer 3 (Cisco Catalyst 3550-48), 4.4 Gbps maximum forwarding bandwidth at Layer 2 and Layer 3 (Cisco Catalyst 3550-24, Cisco Catalyst 3550-24-DC, and Cisco Catalyst 3550-24-FX) • 17.0 Mpps forwarding rate for 64-byte packets (Cisco Catalyst 3550-12G and 3550-12T), 10.1 Mpps forwarding rate for 64-byte packets (Catalyst 3550-48), 6.6 Mpps forwarding rate for 64-byte packets (Cisco Catalyst 3550-24, Cisco Catalyst 3550-24-DC, and Cisco Catalyst 3550-24-FX) • 4 MB memory architecture shared by all ports (Cisco Catalyst 3550-12G, 3550-12T, and 3550-48), 2 MB memory architecture shared by all ports (Cisco Catalyst 3550-24, Cisco Catalyst 3550-24-DC, and Cisco Catalyst 3550-24-FX) • 64 MB DRAM and 16 MB Flash memory for CPU subsystem • Configurable up to 12,000 MAC addresses (Cisco Catalyst 3550-12G and 3550-12T), configurable up to 8,000 MAC addresses (Cisco Catalyst 3550-48, 3550-24, 3550-24-DC, and Cisco Catalyst 3550-24-FX) • Configurable up to 24,000 unicast routes (Cisco Catalyst 3550-12G and 3550-12T), Configurable up to 16,000 unicast routes (Cisco Catalyst 3550-48, Cisco Catalyst 3550-24, Cisco Catalyst 3550-24-DC, and Cisco Catalyst 3550-24-FX) • Configurable up to 8,000 multicast routes (Cisco Catalyst 3550-12G and 3550-12T), Configurable up to 2,000 multicast routes (Cisco Catalyst 3550-48, Catalyst 3550-24, Catalyst 3550-24-DC, and Catalyst 3550-24-FX)



Feature	Description
	• Configurable Maximum Transmission Unit (MTU) of up to 2,000 Bytes for bridging of MPLS tagged frames (Cisco Catalyst 3550-12G and 3550-12T), Configurable Maximum Transmission Unit (MTU) of up to 1,546 Bytes for bridging of MPLS tagged frames (Cisco Catalyst 3550-48, Cisco Catalyst 3550-24, Cisco Catalyst 3550-24-DC, and Cisco Catalyst 3550-24-FX)
Management	• BRIDGE-MIB (RFC 1493) • CISCO-CDP-MIB • CISCO-CLUSTER-MIB • CISCO-CONFIG-MAN-MIB • CISCO-FLASH-MIB • CISCO-HSPR-EXT-MIB • CISCO-HSRP-MIB • CISCO-IGMP-FILTER-MIB • CISCO-IMAGE-MIB • CISCO-L2L3-INTERFACE-MIB • CISCO-MAC-NOTIFICATION-MIB • CISCO-MEMORY-POOL-MIB • CISCO-PAGP-MIB • CISCO-PORT-QOS-MIB • CISCO-PROCESS-MIB • CISCO-RTTMON-MIB (subsystems supported: sub_rtt_rmon and sub_rtt_rmonlib) • CISCO-STACK-MIB (only a subset of the available MIB objects are implemented; not all objects are supported) • CISCO-STP-EXTENSIONS-MIB • CISCO-TCP-MIB • CISCO-VLAN-IFTABLE-RELATIONSHIP-MIB • CISCO-VLAN-IFINDEX-RELATIONSHIP-MIB • CISCO-VLAN-MEMBERSHIP-MIB • CISCO-VTP-MIB • ENTITY-MIB • IF-MIB • IGMP-MIB • IPMROUTE-MIB • OLD-CISCO-CHASSIS-MIB



Feature	Description
	• OLD-CISCO-SYSTEM-MIB • OLD-CISCO-TS-MIB • OSPF-MIB (RFC 1253) • PIM MIB • RFC1213-MIB • RMON1-MIB (only RMON etherStats, etherHistory, alarms, and events are supported) • RMON2-MIB • SNMPv2-MIB • TCP-MIB • UDP-MIB
Standards	• IEEE 802.1x • IEEE 802.1w • IEEE 802.1s • IEEE 802.3x full duplex on 10BaseT, 100BaseTX, and 1000BaseT ports • IEEE 802.1D Spanning-Tree Protocol • IEEE 802.1p CoS Prioritization • IEEE 802.1Q VLAN • IEEE 802.3 10BaseT specification • IEEE 802.3u 100BaseTX specification • IEEE 802.3ab 1000BaseT specification • IEEE 802.3z 1000BaseX specification • 1000BaseX (GBIC) • 1000BaseSX • 1000BaseLX/LH • 1000BaseZX • 1000Base-CWDM GBIC 1470nm • 1000Base-CWDM GBIC 1490nm • 1000Base-CWDM GBIC 1510nm • 1000Base-CWDM GBIC 1530nm • 1000Base-CWDM GBIC 1550nm • 1000Base-CWDM GBIC 1570nm • 1000Base-CWDM GBIC 1590nm



Feature	Description														
	• 1000Base-CWDM GBIC 1610nm • RMON I and II standards • SNMPv1, SNMPv2c, AND SNMPv3														
Year 2000 (Y2K) compliance	• Y2K compliant														
Connectors and cabling	• 10BaseT ports: RJ-45 connectors; two-pair Category 3, 4, or 5 unshielded twisted-pair (UTP) cabling • 100BaseTX ports: RJ-45 connectors; two-pair Category 5 UTP cabling • 100BaseFX ports: MT-RJ connectors, 50/125 or 62.5/125 micron multimode fiber-optic cabling <table> <tr> <th>Type of Cable</th><th>Cisco Part Number</th></tr> <tr> <td>• 1-meter, MT-RJ-to-SC multimode cable</td><td>CAB-MTRJ-SC-MM-1M</td></tr> <tr> <td>• 3-meter, MT-RJ-to-SC multimode cable</td><td>CAB-MTRJ-SC-MM-3M</td></tr> <tr> <td>• 5-meter, MT-RJ-to-SC multimode cable</td><td>CAB-MTRJ-SC-MM-5M</td></tr> <tr> <td>• 1-meter, MT-RJ-to-ST multimode cable</td><td>CAB-MTRJ-ST-MM-1M</td></tr> <tr> <td>• 3-meter, MT-RJ-to-ST multimode cable</td><td>CAB-MTRJ-ST-MM-3M</td></tr> <tr> <td>• 5-meter, MT-RJ-to-ST multimode cable</td><td>CAB-MTRJ-ST-MM-5M</td></tr> </table> • 1000BaseT ports: RJ-45; two-pair Category 5 UTP cabling • 1000BaseT GBIC-based ports: RJ-45 connectors; two-pair Category 5 UTP cabling • 1000BaseSX, -LX/LH, -ZX, and CWDM GBIC-based ports: SC fiber connectors, single-mode or multimode fiber • Cisco GigaStack GBIC ports: copper-based Cisco GigaStack cabling • Management console port: 8-pin RJ-45 connector, RJ-45-to-RJ-45 rollover cable with RJ-45-to-DB9 adapter for PC connections; for terminal connections, use RJ-45-to-DB25 female data-terminal-equipment (DTE) adapter (can be ordered separately from Cisco, part number ACS-DSBUASYN=)	Type of Cable	Cisco Part Number	• 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
Type of Cable	Cisco Part Number														
• 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	Customers can provide power to a switch by using either the internal power supply or the Cisco RPS 300 Redundant Power System. The connectors are located at the back of the switch. Internal Power Supply Connector • 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 Connector														



Feature	Description
	• The connector offers connection for an optional Cisco RPS 300 that uses AC input and supplies DC output to the switch. • The connector offers a 300-watt redundant power system that can support 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 device fails and provides power to the failed device, preventing loss of network traffic. • Attach only the Cisco RPS 300 (model PWR300-AC-RPS-N1) to the redundant-power-supply receptacle.
Indicators	• 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 (HxWxD)	• 2.63 x 17.5 x 15.9 in. (6.7 x 40.4 x 44.5 cm) (Cisco Catalyst 3550-12G and 3550-12T) • 1.75 x 17.5 x 14.4 in. (4.45 x 36.6 x 44.5 cm) (Cisco Catalyst 3550-24 and Cisco Catalyst 3550-24-DC) • 1.75 x 17.5 x 16.3 in. (4.45 x 41.3 x 44.5 cm) (Cisco Catalyst 3550-48 and Cisco Catalyst 3550-24-FX) • 1.5 rack-unit (RU) high (Cisco Catalyst 3550-12G and 3550-12T) • 1.0 RU high (Cisco Catalyst 3550-48, Cisco Catalyst 3550-24, Cisco Catalyst 3550-24-DC, and Cisco Catalyst 3550-24-FX) • 16 lb (7.26 kg) (Cisco Catalyst 3550-12G and 3550-12T) • 11 lb (5.0 kg) (Cisco Catalyst 3550-24 and Cisco Catalyst 3550-24-DC) • 13 lb (5.9 kg) (Cisco Catalyst 3550-48) • 12 lb (5.45 kg) (Cisco Catalyst 3550-24-FX)
Environmental ranges	• Operating temperature: 32 to 113°F (0 to 45°C) • Storage temperature: –13 to 158°F (–25 to 70°C) • Operating relative humidity: 10 to 85% (noncondensing) • Operating altitude: Up to 10,000 ft (3049 m) • Storage altitude: Up to 15,000 ft (4573 m)
Power requirements	• Power consumption: 190W (maximum), 650 BTUs per hour (Cisco Catalyst 3550-12G and 3550-12T); 65W (maximum), 222 BTUs per hour (Cisco Catalyst 3550-24); 110W (maximum), 375 BTUs per hour (Cisco Catalyst 3550-48); 72W (maximum), 250 BTUs per hour (Cisco Catalyst 3550-24-DC); 85W (maximum), 290 BTUs per hour (Cisco Catalyst 3550-24-FX) • AC input voltage/frequency: 100 to 127/200 to 240 VAC (auto-ranging), 50 to 60 Hz



Feature	Description
	- DC input voltages - RPS input: +12V @ 13A (Catalyst 3550-12G, 3550-12T, and 3550-48); +12V @ 8.3A (Catalyst 3550-24 and 3550-24-FX) - DC input for 3550-24-DC: –36 to –72VDC @ 2A
Acoustic noise	- ISO 7770, bystander position—operating to an ambient temperature of 30 degrees Celsius: - Catalyst 3550-12G and 3550-12T: 58 dBa - Catalyst 3550-24 and 3550-24-DC: 48 dBa - Catalyst 3550-48 and 3550-24-FX: 46 dBa
Mean time between failure (MTBF)	110,332 hours (Cisco Catalyst 3550-12G) 113,658 hours (Cisco Catalyst 3550-12T) 193,000 hours (Cisco Catalyst 3550-24) 163,000 hours (Cisco Catalyst 3550-48) 183, 000 hours (Cisco Catalyst 3550-24-DC) 186,000 hours (Cisco Catalyst 3550-24-FX)

Regulatory Agency Approvals	
Safety certifications	- UL to UL 1950, Third Edition - c-UL to CAN/CSA 22.2 No. 950-95, Third Edition - TUV/GS to EN 60950 with Amendment A1-A4 and A11 - CB to IEC 60950 with all country deviations - NOM to NOM-019-SCFI - CE Marking
Electromagnetic emissions certifications	- FCC Part 15 Class A - EN 55022 Class A (CISPR 22 Class A) - VCCI Class A - AS/NZS 3548 Class A - BSMI - CE Marking
Network Equipment Building Systems (NEBS) (for 3550-24-DC)	- Bellcore - GR-1089-CORE - GR-63-CORE - SR-3580 Level 3
Warranty	Limited lifetime warranty



Service and Support

The services and support programs described in the Table below are available as part of the Cisco Desktop Switching Service and Support solution, and are available directly from Cisco and through resellers.

Service and Support	Features	Benefits
Cisco Advanced Services		
Cisco Total Implementation Solutions (TIS)—available direct from Cisco Packaged Total Implementation Solutions (Packaged TIS)—available through resellers	• Project management • Site survey, configuration deployment • Installation, text, and cutover • Training • Major moves, adds, changes (MAC) • Design review and product staging	• Supplements existing staff • Ensures functionality meets needs • Mitigates risk
Cisco Technical Support Services		
Cisco SMARTnet™ and SMARTnet Onsite (OS)—available direct from Cisco Packaged SMARTnet—available through resellers	• 24x7 access to software updates • Web access to technical repositories • Telephone support through the Cisco Technical Assistance Center • Advance replacement of hardware parts	• Enables proactive or expedited issue resolution • Lowers cost of ownership by utilizing Cisco expertise and knowledge • Minimizes network downtime

Ordering Information

Model Numbers	Configuration
WS-C3550-12G	• 10 1000BaseX ports + 2 10/100/1000BaseT ports • 1.5 rack unit (RU) stackable, multilayer Gigabit Ethernet switch • Provides advanced IP routing
WS-C3550-12T	• 10 10/100/1000BaseT ports + 2 1000BaseX ports • 1.5 rack unit (RU) stackable, multilayer Gigabit Ethernet switch • Provides advanced IP routing
WS-C3550-24-SMI	• 24 10/100 ports + 2 1000BaseX ports • 1 RU stackable, multilayer switch • Provides advanced IP routing • Standard Multilayer Software Image (SMI) installed, upgradable to advanced IP routing
WS-C3550-24-DC-SMI	• 24 10/100 ports + 2 1000BaseX ports • 1 RU stackable, multilayer switch; DC-Powered • Provides basic IP routing • Standard Multilayer Software Image (SMI) installed, upgradable to advanced IP routing



Model Numbers	Configuration
WS-C3550-24-FX-SMI	• 24 100FX ports + 2 1000BaseX ports • 1 RU stackable, multilayer switch • Provides basic IP routing • Standard Multilayer Software Image (SMI) installed, upgradable to advanced IP routing
WS-C3550-24-EMI	• 24 10/100 ports + 2 1000BaseX ports • 1 RU stackable, multilayer switch • Enhanced Multilayer Software Image (EMI) installed • Provides advanced IP routing
WS-C3550-48-SMI	• 48 10/100 ports + 2 1000BaseX ports • 1 RU stackable, multilayer switch • Standard Multilayer Software Image (SMI) installed, upgradable to advanced IP routing
WS-C3550-48-EMI	• 48 10/100 ports + 2 1000BaseX ports • 1 RU stackable, multilayer switch • Enhanced Multilayer Software Image (EMI) installed • Provides advanced IP routing
CD-3550-EMI=	• Enhanced Multilayer Software Image (EMI) upgrade kit for standard versions of the Cisco Catalyst 3550-24, 3550-24-DC, 3550-24-FX, and 3550-48 switches • Provides advanced IP routing
RCKMNT-3550-1.5RU=	• Spare rack mount kit for the Cisco Catalyst 3550-12G and 3550-12T switches
RCKMNT-1RU=	• Spare rack mount kit for the Cisco Catalyst 3550-24, 3550-24-DC, 3550-24-FX, and 3550-48 switches

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