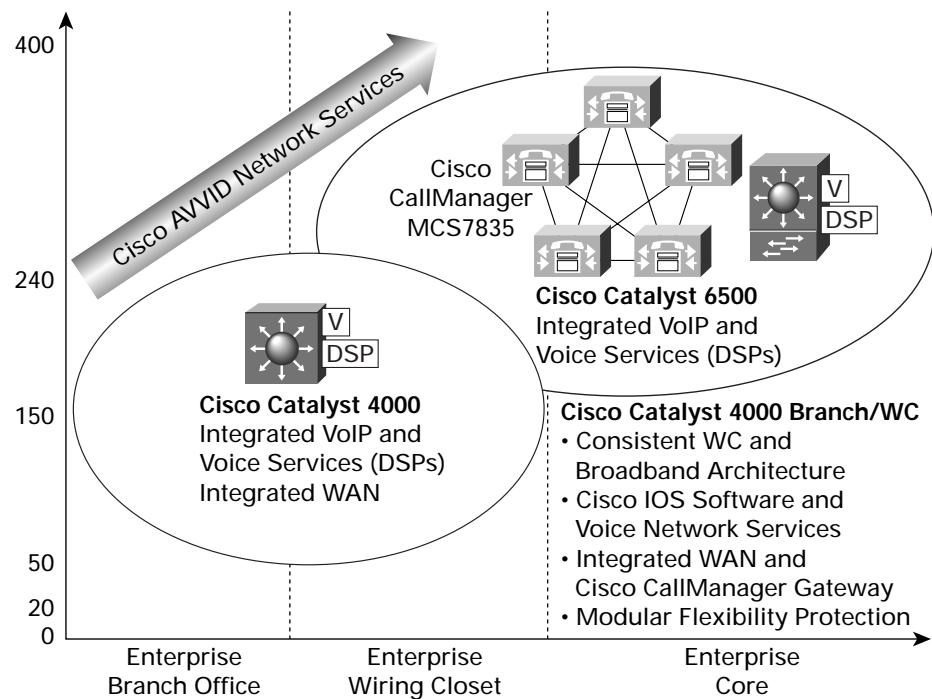


# Cisco Catalyst 4000 Series Switches

Extending Cisco IP Convergence Solutions into Wiring Closets and Enterprise Branch Offices

Businesses today must continually find new ways to stay agile and gain a competitive edge. To do this, they need to use technology to quickly and effectively respond to market shifts by personalizing customer service, streamlining supply chain management, and delivering new services. Sophisticated applications such as unified messaging, multimedia and video streaming, and packet telephony require a highly intelligent network infrastructure, as well as converged, multiservice networks—single infrastructures that carry data, voice, and video traffic. Cisco Systems® enables converged networking over integrated LAN and WAN infrastructures with Cisco® AVVID (Architecture for Voice, Video and Integrated Data). This award-winning architecture enables a consistent, intelligent infrastructure throughout the enterprise, providing a safe, flexible networking environment that can easily adapt to change and accommodate future technologies (Figure 1).

Figure 1  
 Enterprise Positioning





As the worldwide leader in networking for the Internet, Cisco expands the breadth and depth of solutions based on Cisco AVVID, with additions and enhancements to the popular Cisco Catalyst® 4000 Series switches. The Cisco Catalyst 4000 Series extends convergence to the enterprise wiring closet and branch office with a premium, modular solution that is consistent with the Cisco Catalyst backbone. With fully extended, ubiquitous access to information anywhere in the enterprise, enterprises can enjoy dependable communication and collaboration between their corporate sites and branch offices.

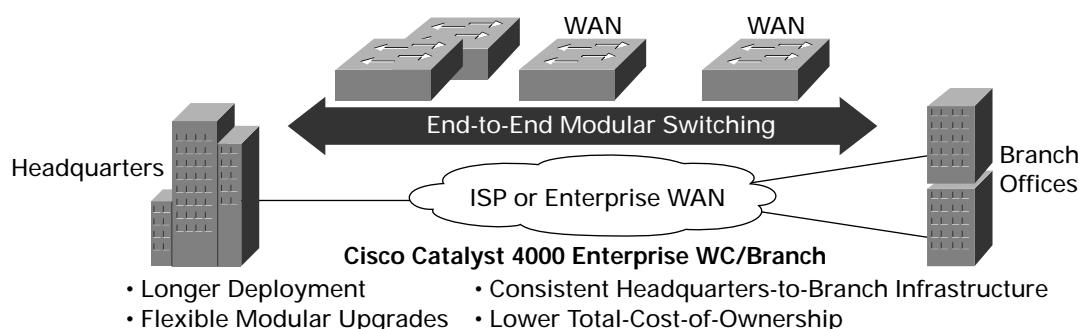
Leading the Cisco Catalyst 4000 Series switches is the 6-slot Cisco Catalyst 4006 switch, delivering very high performance across a 64-Gbps backplane and higher port densities on new line cards. Other additions to the Cisco Catalyst 4000 Series offer enterprises an unprecedented ability to cost-effectively deploy advanced network services into enterprise branch offices—in one box. Replacing nonintelligent, Layer 2 stackable Ethernet switches, the Cisco Catalyst 4000 Series extends all the functions and benefits of solutions based on Cisco AVVID into branch offices. Supported functions include high density, switched 10/100 and Gigabit Ethernet in the LAN, packet telephony, content networking, security, quality of service (QoS), and integrated WAN access—in a modular design that provides flexibility and a longer window of deployment at a very aggressive price.

#### Benefits of Cisco Catalyst 4000 Series Switches

The Cisco Catalyst 4000 Series offers enterprise managers many benefits for the wiring closet and branch office, and even for small server farms (Figure 2). Benefits include:

- *Breakthrough price and performance*—Blending advanced engineering and advances in manufacturing, the Cisco Catalyst 4000 Series delivers a powerful, flexible enterprise switching solution at a price per port that rivals comparable fixed-configuration switches.
- *Convergence*—High-performance engines and the latest software features make it easy to transport any combination of data, voice, and video traffic. Integrated Layer 3 switching and Layer 4 Web hosting capabilities allow easy integration of future technologies.
- *High availability*—“Self-healing” network intelligence is fast enough to recover from port, device, and link failures without noticeable delays at the desktop. Combining more features into fewer chips translates to a mean-time-between-failure (MTBF) rate that is five times higher than many competitors’.
- *Investment protection*—Flexible, modular architecture has a wider deployment window and longer shelf life; both Cisco Catalyst 4003 and 4006 chassis use the same power supplies and switching line cards for easy sparing.

Figure 2  
End-to-End Cisco Catalyst Consistency





## Cisco Catalyst 4000 Series System Architecture

Components and capabilities new to the Cisco Catalyst 4000 Series architecture break new ground for price and performance, advanced network services, and converged networking in the wiring closet and branch office (Figure 3). With modular options for numerous port densities and functions, enterprises can use the Cisco Catalyst 4000 Series in networks with the flexibility to select the size that best fits each need.

Figure 3  
Cisco Catalyst 4000 Series Switches



Leading the Cisco Catalyst 4000 Series switches is the modular, 6-slot Cisco Catalyst 4006 switch with a powerful, new Supervisor Engine IV and 64-Gbps backplane, joining the popular 3-slot Cisco Catalyst 4003 Switch. Further improving on price and performance are the fixed-configuration Cisco Catalyst 2948G and 2980G switches, based on Cisco CatOS and delivering high-density, 10/100 Fast Ethernet and Gigabit Ethernet switching to the desktop.

### Features

- *Performance*—Powered by leading-edge ASIC technology that offers wire-speed, Cisco Express Forwarding-based, integrated Layers 2–4 forwarding across switched 10/100 or Gigabit Ethernet interfaces.
- *Supervisor Engine IV*—Supported on the Cisco Catalyst 4006 chassis and based on Cisco IOS® Software; offers integrated multilayer switching at 48 Mpps and scales to support a 64-Gbps switching capacity.
- *Supervisor Engine II-Plus*—Supported on the Cisco Catalyst 4006 chassis and based on Cisco IOS Software; offers Layer 2 switching with basic Layer 3 services for an entry-level Cisco IOS Software-based solution.
- *Supervisor Engine II*—Supported on the Cisco Catalyst 4006 chassis and based on Cisco CatOS; offers wire-speed Layer 2 switching at 18 Mpps.
- *Functionally transparent line cards*—A centralized, shared-memory fabric on the chassis makes it easy to upgrade all system ports to higher-layer switching by simply adding optional engines, such as the Supervisor Engine IV, without replacing existing line cards. This advanced, simplified architecture extends the useful deployment life of Cisco Catalyst 4000 Series line cards.
- *Interchangeable line cards*—All line cards operate in both the Cisco Catalyst 4003 and 4006 chassis for easy sparing.
- *Gigabit Ethernet to the desktop*—Extends the Cisco Catalyst 4000 Series rich offering of Gigabit Ethernet solutions to the desktop with new line cards and Gigabit-over-copper 1000BASE-T interfaces.



- *Inline power*—Powers the latest Cisco IP phones through an Ethernet connection from a line card; integrated voice-over-IP (VoIP) software enables advanced voice features and transport.
- *Integrated WAN access*—The Cisco Catalyst 4500 Series Access Gateway Module provides WAN access, voice gateway services, and IP routing.
- *Cisco IOS Software network services*—Incorporates mature Layer 2 and Layer 3 software features such as QoS and security with Layer 4 Web visibility to meet the advanced networking demands of enterprise businesses.
- *Hardware-based multicast*—Fully supports standards-based multimedia networking with Protocol Independent Multicast (PIM) dense and sparse mode, Internet Group Multicast Protocol (IGMP), and Cisco Group Multicast Protocol (GMP).

For more information about Cisco Catalyst 4000 Series components, visit:

<http://www.cisco.com/en/US/partner/products/hw/switches/ps663/index.html>

#### Expanded Cisco Catalyst 4000 Series Connectivity

Adding to an already broad set of connectivity options for the modular Cisco Catalyst 4006 and 4003 chassis, new line cards support up to 240 ports of 10/100/1000 high-density Gigabit Ethernet to the desktop with intelligent Layer 3 services. All line cards are compatible in both modular chassis for easy sparing and optimal flexibility. Other components include the Supervisor Engine IV, integrated WAN routing, and inline power 10/100 Ethernet.

#### Cisco Catalyst 4500 Series Supervisor Engine IV

The Cisco Catalyst 4500 Series Supervisor Engine IV is backward-compatible with the Cisco Catalyst 4006 Switch for true investment protection and deployment flexibility. The Supervisor Engine IV delivers wire-speed, Cisco Express Forwarding-based Layers 2–4 switching at 48 Mpps with intelligent services, to further enhance control of converged data, voice, and video networks. Intelligent services, based on proven Cisco IOS Software, include granular QoS, predictable performance, advanced security, and comprehensive manageability. An optional NetFlow services card enables the capture, in hardware, of NetFlow statistics and enhanced VLAN statistics for detailed network flow-based monitoring and management.

#### IP Telephony

Several components enable packet telephony services in the Cisco Catalyst 4000 Series, enabling easy extension of IP phone services across the WAN into branch offices, as well as in the wiring closets of corporate headquarters. One capability is inline power over 10/100 Ethernet cables to the latest Cisco IP phones. Managers who deploy inline power 10/100BASE-T Ethernet switching modules in a Cisco Catalyst 4000 Series chassis can position the infrastructure for the addition of IP phones. For safety and easy deployment, embedded intelligence differentiates between IP phones that need inline power and devices that do not. Auxiliary VLANs separate IP phones and PCs into discrete VLANs for easier troubleshooting and IP address plan conservation.



## Access Gateway Module

The Cisco Catalyst 4500 Series Access Gateway Module is compatible with Cisco Catalyst 4000 Series switches and integrates powerful IP telephony and WAN routing into a single platform. As an IP WAN router, the module provides WAN routing capabilities, including support for Network Address Translation (NAT) and for Cisco IOS Firewall and intrusion detection capabilities for perimeter security. IP telephony services, based on powerful digital signal processor (DSP) technology, include PSTN and analog voice gateway functions, Cisco CallManager services, audio conferencing, and G.729a and G.711 transcoding. In IP telephony mode, the module provides advanced microcode programmable technology for superior investment protection.

For more information about Cisco Catalyst 4000 Series line cards, visit:

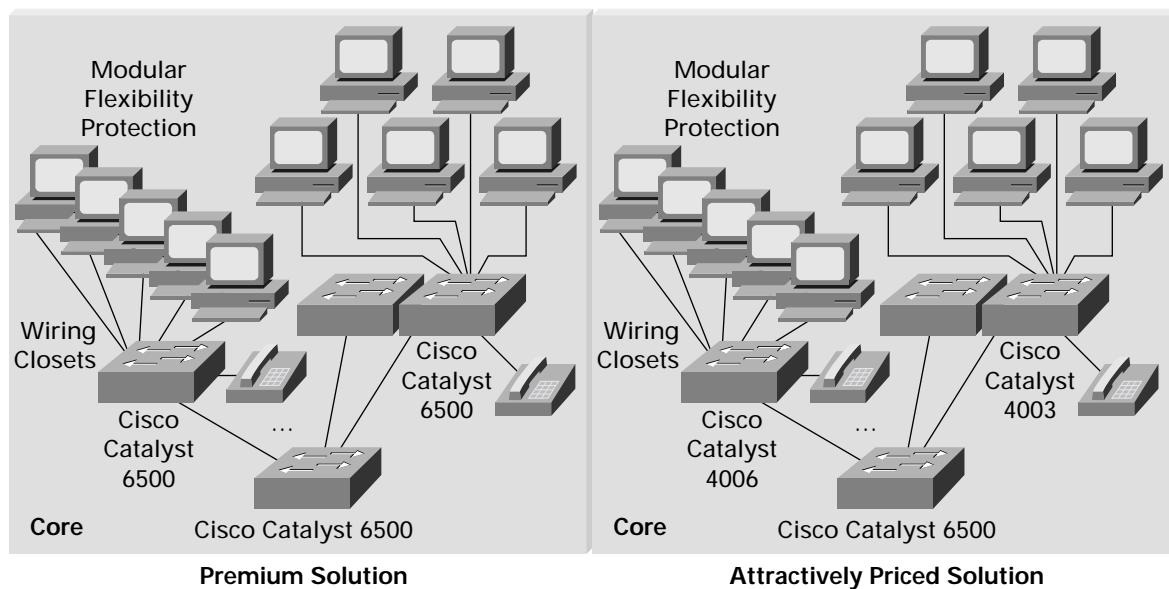
<http://www.cisco.com/en/US/partner/products/hw/switches/ps663/index.html>

## Enterprise Wiring Closet

In the enterprise wiring closet, Cisco Catalyst 4000 Series switches enhance today's Layer 2 enterprise wiring closet switches and help to ensure investment protection with the ability to add new services without sacrificing current line cards. Dual Gigabit Ethernet uplinks from the supervisor engine support a high-availability system architecture to the distribution layer, while advanced Cisco IOS Software features bring QoS, security, multicast, IP routing, and IP telephony services close to users. By distributing high-touch processes into the wiring closet, administrators can scale to support advanced network services and meet the disparate requirements of mission-critical data, voice, and multimedia streaming applications. The design also supports VLAN trunking for separate IP address management of IP telephones and workstations, and Dynamic Host Configuration Protocol (DHCP) addressing for PC and IP telephone mobility (Figure 4) along with the capability to autodiscover and power IP phones over the Ethernet Category 5 cable.

Figure 4

Convergence in the Enterprise Wiring Closet



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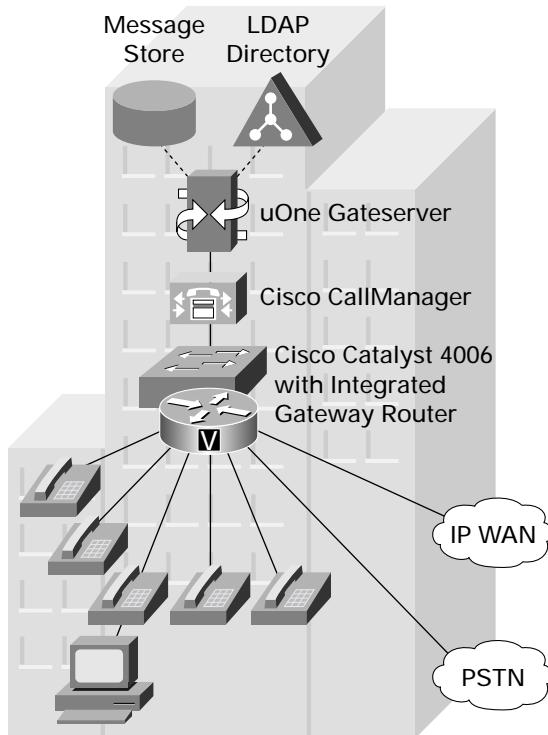


## Packet Voice

Cisco AVVID provides the intelligent infrastructure that enables highly flexible IP telephony solutions and voice communications solutions for enterprise wiring closets and branch offices. The IP telephony solution for the Cisco Catalyst 4000 Series includes five elements—the inline power 10/100BASE-T switching module, the auxiliary DC power shelf and accessories for the Cisco Catalyst 4006 chassis, inline power, phone discovery, and auxiliary VLANs. Inline power through Ethernet connections to IP phones eliminates the need to provide power adaptors with each telephone set at the desktop, while helping to ensure continuous telephone service in the event of a power outage or emergency.

The Cisco Inline Power 10/100BASE-T Switching Module can be deployed in either a Cisco Catalyst 4003 or 4006 chassis, but power is injected in different ways. The Cisco Catalyst 4003 chassis uses the external Cisco Catalyst Inline Power Patch Panel to provide inline power to IP phones through the Cisco Inline Power 10/100BASE-T Switching Module. The Cisco Catalyst 4006 injects power directly through the chassis through the combination of the external Auxiliary DC Power Shelf and the Cisco Catalyst 4000 Power Entry Module (PEM). The PEM is the interface between the power shelf and the inline power 10/100BASE-T switching module, and inserts into a dedicated bay on the Cisco Catalyst 4006 chassis, preserving modular slots for line cards (Figure 5).

Figure 5  
Cisco Catalyst 4000 Series Enables Packet Telephony



The Cisco Inline Power Switching Module Phone Discovery feature eases network management and provides safety by automating the inline power feature. Phone Discovery automatically detects the presence of Cisco IP phones and supplies inline power. The feature differentiates between Cisco IP phones and other devices such as network interface cards (NICs), and will not supply power to devices not designed to use inline power. The auxiliary VLAN feature

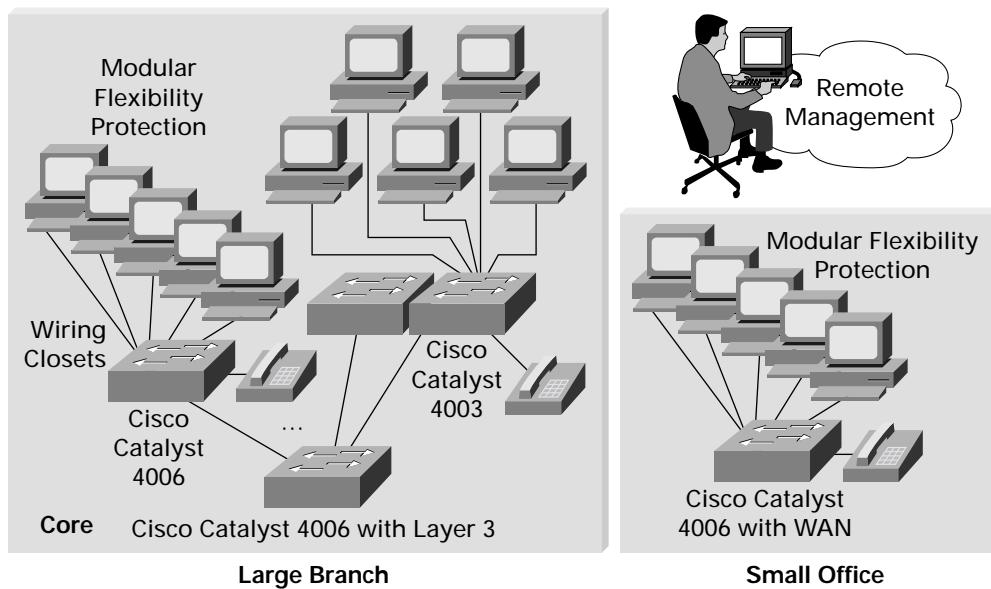


automatically configures a separate VLAN for IP phones to overcome the complexity of adding packet voice to an IP data network. VLAN segmentation lets managers preserve existing IP address topologies and assists in troubleshooting.

#### LAN-WAN Integration in Branch Offices

Cisco dramatically reduces the cost of branch office networking with Cisco Catalyst 4000 Series switches. When configured with a Cisco Catalyst 4500 Series Access Gateway Module, the Cisco Catalyst 4000 Series integrates IP telephony services and WAN routing services, including perimeter security and hardware-based encryption, for branch offices into a single box (Figure 6). The Cisco Catalyst 4500 Series Access Gateway Module has modular slots to accommodate the same WAN interface cards (WIC) and voice interface cards (VIC) as the popular Cisco 1700, 2600, and 3700 series routers, to enable WAN and IP telephony services. When combined with other Ethernet line cards, the Cisco Catalyst 4000 Series with an Access Gateway Module can provide secure high performance, multilayer LAN switching, IP WAN access, and IP telephony services to branch offices—all in a single platform at a competitive price.

Figure 6  
Cisco Catalyst 4000 Series in the Branch Office



#### Ready for the New World

The Cisco Catalyst 4000 Series enables Cisco AVVID network services in the wiring closet and branch office at an affordable price per port. By delivering wire-speed, multilayer switching, integrated WAN and IP telephony services, and advanced Cisco IOS Software services like QoS and security, the cost-effective Cisco Catalyst 4000 Series switches are a critical part of a scalable, highly available network infrastructure that is ready to support emerging multiservice applications. Enterprises need Internet-based applications to deliver superior customer care, streamline operations, manage supply chains, and extend connectivity to increasingly mobile workforces. Emerging multiservice applications may spell the difference between surviving and thriving in the highly competitive Internet age. The Cisco

Catalyst 4000 Series' flexible, chassis configuration protects networks from future technology evolution and provides a longer window of deployment than fixed alternatives.

For more information about Cisco Catalyst 4000 Series switches, the Cisco AVVID architecture, and other Cisco Catalyst switch solutions, contact your Cisco reseller or account representative, or visit:

<http://www.cisco.com/en/US/partner/products/hw/switches/ps663/index.html>



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