

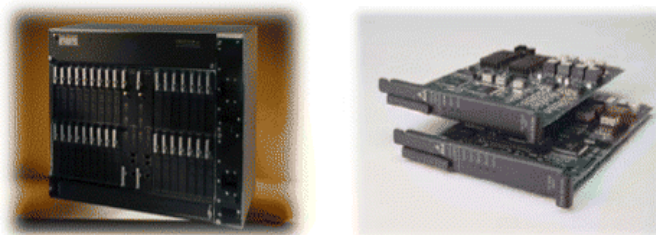
## Cisco 6160 IP DSL Switch

The Cisco 6160 is a 32-slot, multiport line-card architecture that supports industry-standard asymmetric digital subscriber line (ADSL), and high-speed symmetric digital subscriber line (SHDSL) line technologies. Targeting North American central-office environments, the Cisco 6160 is fully compliant with relevant Network Equipment Building Standards (NEBS), American National Standards Institute (ANSI), and ATM carrier-class network-element standards. Network transmission connections include DS3, 8xT1 inverse multiplexing over ATM (IMA), OC-3c single mode, and OC-3c multimode. Up to 256 ports per chassis can be provisioned with ADSL (discrete multitone [DMT]), G.shdsl. A variety of configuration and cabling options are available to support a mix of xDSL services within a common chassis. For “above voice-band” or “line sharing” ADSL applications, the Cisco 6160 can also be used with various third-party Plain Old Telephone Service (POTS) splitters.

The Cisco 6160 provides an evolution path from today’s unspecified bit rate (UBR)-oriented Internet access service model, popular for most high-volume consumer DSL service rollouts, to a comprehensive UBR, constant bit rate (CBR), nonreal-time variable bit rate (VBR-nrt), real-time variable bit rate (VBR-rt), and available bit rate (ABR) class of service (CoS) family required for the growing demands of telecommuter and business customers with mission-critical applications. In addition to supporting industry-leading traffic management through I.371-compliant policing, extensive-output queue buffering, and virtual path (VP)-granularity shaping, the Cisco 6160 platform can provide the kind of robust ATM capabilities typically found only in edge-switch or higher-class products. Individual rate schedulers can support up to 3328 ports with a subtended configuration, allowing network providers to extract maximum value from each network trunk connection without creating the “parking lot” problem characteristic of first-generation DSLAM architectures.

The Cisco 6160 is deployed with Network Interface Card (NI-2) based common cards, which can be managed via the Cisco DSL Manager. The Cisco DSL Manager network management system is a complete Simple Network Management Protocol (SNMP)-based element management system with fault, configuration, and performance reporting capabilities. A Cisco IOS® Software command-line interface (CLI) is also available for craft interaction.

Figure 1  
 Cisco 6160 IP DSL  
 Switch



## Key Features and Benefits

- **Multiservice DSL**—The Cisco 6160 offers a wide variety of DSL line cards in 4- and 8-port densities for support of standards-based ADSL and SHDSL technologies. ADSL line cards support full-rate operation per G.992.1 (G.dmt) and ANSI T1.413 Issue 2 with data rates up to 8-Mbps downstream and 1-Mbps upstream. G.992.2 (G.lite) operation is also supported, offering data rates up to 1.536-Mbps downstream and 512-kbps upstream. SHDSL line cards offer data rates of up to 2.312 Mbps symmetric.
- **Advanced IP+ATM services architecture**—The Cisco 6160 internal design is based on a high-performance, nonblocking ATM switching architecture that also encompasses IP Layer 3 services. The ATM switching architecture supports all ATM service classes including CBR, VBR, VBR-nrt, UBR, ABR, and the richest set of ATM traffic management and shaping capabilities. Revenue-generating, differentiated Layer 3 IP services include Multiprotocol Label Switching (MPLS), subscriber termination Point-to-Point Protocol over ATM, Ethernet (PPPoA/E), Layer 2 Tunneling Protocol (L2TP) tunneling, and routing bridging encapsulation (RBE).
- **Network management support**—The Cisco DSL Manager provides comprehensive Cisco 6160 element management and operations support based on standard SNMP. Additionally, using standards-based network management interfaces and protocols, the Cisco DSL Manager can be directly integrated with other Cisco or customer-provided operations management systems for delivery of integrated, end-to-end service-management solutions.
- **Standards compliant**—The Cisco 6160 fully conforms to UL1950, ICCS-003, FCC Part 15/Part 68, Telecordia GR-1089-CORE, and Telecordia GR-63-CORE (NEBS Level 3) as required for central office or co-location deployment. Compliance to ATM, ANSI, and International Telecommunications Union (ITU) standards is also provided.

## Specifications

### Hardware

**Table 1** Technical Specifications for Cisco 6160

Description	Specification
Card Slots	<ul style="list-style-type: none"> <li>• Subscriber line card slots: 32</li> <li>• NI-2 system card slots: 2 (1 + 1 redundancy optional)</li> </ul>
Cabling	<ul style="list-style-type: none"> <li>• DSL interface connectors: 11 RJ-21 (50-pin CHAMP)</li> <li>• Auxiliary ports: 1 RJ-45 connector</li> <li>• Console ports: 1 RJ-45 connector</li> <li>• Office alarm support: 6 alarm-relay connectors</li> </ul>
NI-2 system card interface options	<ul style="list-style-type: none"> <li>• 1 OC-3c WAN Interface, 1 OC-3c subtend interface</li> <li>• Dual SC fiber</li> <li>• Single mode intermediate reach and multimode</li> </ul>
Network Interfaces	<ul style="list-style-type: none"> <li>• 1 DS3 WAN interface, 2 DS3 subtend interfaces</li> <li>• 1 DS3 WAN interface, 2 DS3 subtend interfaces, 8 x T1 IMA WAN or subtend interfaces</li> </ul>
ATM Features	<ul style="list-style-type: none"> <li>• ATM UNI 3.1/4.0</li> <li>• UBR, ABR, VBR-nrt, VBR-rt, CBR</li> <li>• PVCs, SPVCs, and SVCs</li> <li>• 512K VCs, 256 VPs (32 shaped)</li> <li>• ILMI</li> <li>• IISP/PNNI</li> <li>• Egress traffic shaping</li> <li>• Traffic policing (usage parameter control) per ITU-T I.371 and ATM Forum UNI Specifications</li> <li>• Early packet discard (EPD), partial packet discard (PPD)</li> </ul>
IP Features	<ul style="list-style-type: none"> <li>• RFC1483 Routed to MPLS VPN</li> <li>• RBE to MPLS VPN</li> <li>• PPPoE to L2TP</li> <li>• PPPoA to L2TP</li> </ul>

**Table 1** Technical Specifications for Cisco 6160

Description	Specification
Management System	<ul style="list-style-type: none"> <li>• Cisco DSL Manager</li> </ul>
Other	<ul style="list-style-type: none"> <li>• Management interfaces               <ul style="list-style-type: none"> <li>– In-band: ATM VC</li> <li>– Out-of-band: 10BaseT Ethernet (RJ-45)</li> </ul> </li> <li>• EIA/TIA-232 Console (RJ-45)</li> <li>• EIA/TIA-232 Auxiliary (RJ-45)</li> <li>• External timing interface (BITS)</li> </ul>
DSL line card options	<ul style="list-style-type: none"> <li>• Quad-Port ADSL (DMT and CAP) "Flexi" Card               <ul style="list-style-type: none"> <li>– ANSI T1.413 Issue 2, 32- to 8032-kbps downstream, 32- to 1024-kbps upstream</li> <li>– ITU G.992.1 (G.dmt), 32- to 8032-kbps downstream, 32- to 1024-kbps upstream</li> <li>– ITU G.992.2 (G.lite), 32- to 1536-kbps downstream, 32- to 512-kbps upstream</li> <li>– ITU G.994.1 (G.hs)</li> <li>– RADSL-CAP, up to 7.1 Mbps downstream, 1 Mbps upstream</li> </ul> </li> <li>• Octal-Port ADSL (DMT only)               <ul style="list-style-type: none"> <li>– ANSI T1.413 Issue 2, 32- to 8032-kbps downstream, 32- to 1024-kbps upstream</li> <li>– ITU G.992.1 (G.dmt), 32- to 8032-kbps downstream, 32- to 1024-kbps upstream</li> <li>– ITU G.992.2 (G.lite), 32- to 1536-kbps downstream, 32- to 512-kbps upstream</li> <li>– ITU G.994.1 (G.hs)</li> </ul> </li> <li>• Octal-Port G.shdsl (TC-PAM)               <ul style="list-style-type: none"> <li>– ITU G.991.2</li> <li>– Up to 2.3-Mbps symmetric</li> </ul> </li> </ul>

**Table 2** Power Requirements for Cisco 6160

Description	Specification
DC power entry modules	1 minimum (1 + 1 redundancy optional)
Power input (redundant)	Rated operation: –48/–60 Volts DC Nominal Input operating range: –42V to –72 Volts DC

**Table 3** Physical and Environmental Specifications for Cisco 6160

Description	Specification
Dimensions (H x W x D)	11 rack units (RUs)—21.35 in. x 18.35 in. x 11.8 in. (54.2 cm x 46.6 cm x 30.0 cm)
Weight (empty)	Approximately 40 lb (18.2 kg)
Operating temperature	5 to 40 C (operating) –5 to 50 C (short-term operating)
Altitude	–60 to 4000 m
Relative humidity	5 to 90% (noncondensing)
Cooling environmental	Forced air using internal fans

**Table 4** Regulatory Approvals for Cisco 6160

Description	Specification
NEBS	Telcordia GR-63-CORE Telcordia GR-1089-CORE Telcordia SR-3580 Level 3
Product Safety	UL 1950, Third Edition EN 60950 2nd Edition, Amendments 1, 2, 3, 4, 11 IEC 60950 2nd Edition, Amendments 1, 2, 3 AS/NZS 3260
Emissions	FCC Part 15 CISPR 22 ICCS-003
Telecom	FCC Part 68 ICCS-003

## Software

**Table 5** Software Feature Licenses for Cisco 6160

License	Description
S61AB21-12XXXDA	Cisco 6100 Series IP DSL Switch—Base software including ATM signaling and QoS
FL61-03	Cisco 6100 Series IP DSL Switch—Subtending
FL61-06	Cisco 6100 Series IP DSL Switch—MPLS
FL61-07	Cisco 6100 Series IP DSL Switch—Bundle of -03 and -06 Licenses

## Ordering Information

### Where to Buy Cisco Products

[http://www.cisco.com/public/ordering\\_info.shtml](http://www.cisco.com/public/ordering_info.shtml)

### Product and Part Numbers

**Table 6** Part Numbers for the Cisco 6160

Part Description	Part Number
Cisco 6160 DSL Access Concentrator	CISCO6160
Cisco 6160 DSL Access Concentrator, spare	CISCO6160=
Cisco 6160 Chassis only	CHAS-6160
Cisco 6160 Chassis only, spare	CHAS-6160=
<b>Cisco 6160 IOS Software</b>	
Cisco 6160 Series IOS Base Software	S61Z-12.X(X)DA
Cisco 6160 Series IOS Base Software, spare	S61Z-12.X(X)DA=
<b>Cisco 6160 Cisco IOS Feature Licenses</b>	
Cisco 6100 IP DSL Switch—Subtending	FL61-03
Cisco 6100 IP DSL Switch—MPLS	FL61-06
Cisco 6100 IP DSL Switch—Bundle of -03 and -06 Licenses	FL61-07
<b>Cisco 6160 Series Network Trunk Card Options</b>	
Cisco 6160 Network I/O Card (DS3 and OC3) installed in 6160 chassis	CHAS6160-W/IO-1
Cisco 6160 Network I/O Card (DS3 and 8xT1 IMA) installed in 6160 chassis	CHAS6160-W/IO-2
Cisco 6160 Network I/O Card (DS3 and OC3)	6160-1-I/O-1
Cisco 6160 Network I/O Card (DS3 and OC3), Spare	6160-1-I/O-1=

**Table 6** Part Numbers for the Cisco 6160

Part Description	Part Number
Cisco 6160 Network I/O Card (DS3 and 8xT1 IMA)	6160-1-I/O-2
Cisco 6160 Network I/O Card (DS3 and 8xT1 IMA)	6160-1-I/O-2=
NI-2, 1 OC-3/STM-1 single mode; 1 WAN, 1 subtend	NI-2-155SM-155SM
NI-2, 1 OC-3/STM-1 single mode; 1 WAN, 1 subtend, spare	NI-2-155SM-155SM=
NI-2, 1 OC-3/STM-1 multimode; 1 WAN, 1 subtend	NI-2-155MM-155MM
NI-2, 1 OC-3/STM-1 multimode; 1 WAN, 1 subtend, spare	NI-2-155MM-155MM=
NI-2, 1 DS3 WAN, 2 DS3 subtend	NI-2-DS3-DS3
NI-2, 1 DS3 WAN, 2 DS3 subtend, spare	NI-2-DS3-DS3=
NI-2, 1 OC-3 SM, 2 DS3 subtend	NI-2-155SM-DS3
NI-2, 1 OC-3 SM, 2 DS3 subtend, spare	NI-2-155SM-DS3=
NI-2, 1 OC-3 MM WAN, 2 DS3 subtend	NI-2-155MM-DS3
NI-2, 1 OC-3 MM WAN, 2 DS3 subtend, spare	NI-2-155MM-DS3=
NI-2, 1 DS3 or 8xT1 IMA WAN, 2 DS3 or 8xT1 IMA subtend	NI-2-DS3-T1E1
NI-2, 1 DS3 or 8xT1 IMA WAN, 2 DS3 or 8xT1 IMA subtend, spare	NI-2-DS3-T1E1=
<b>Cisco 6160 Series DSL Line Cards</b>	
8-port ADSL (DMT) line card	ATUC-8-DMT-1
8-port ADSL (DMT) line card, spare	ATUC-8-DMT-1=
4-port ADSL "Flexi" (DMT and CAP) line card	ATUC-4-FLX-2
4-port ADSL "Flexi" (DMT and CAP) line card, spare	ATUC-4-FLX-2=
8-port G.shdsl (TC-PAM) line card	STUC-8-SHDSL-1
8-port G.shdsl (TC-PAM) line card, spare	STUC-8-SHDSL-1=
<b>Cisco 6160 Series Power Entry Modules</b>	
Cisco 6160 48VDC power supply module	6160-1-PEM-DC
Cisco 6160 48VDC power supply module, spare	6160-1-PEM-DC=
<b>Cisco 6160 Spares and Accessories</b>	
6160 Blower tray air filters, 5	6160-AF-01=
6160 Spare blower assembly	6160-1-BLOWER=

## Documentation

For part numbers for product specific documentation, visit

[http://www.cisco.com/univercd/cc/td/doc/pcat/swdo\\_\\_d1.htm](http://www.cisco.com/univercd/cc/td/doc/pcat/swdo__d1.htm).

## For More Information

Additional information is available at

<http://www.cisco.com/warp/public/cc/pd/si/6000/prodlit/index.shtml> and

<http://www.cisco.com/warp/public/cc/pd/rt/600rt/prodlit/index.shtml>.

## Configuration Worksheets

To order and configure a Cisco 6160 DSL access concentrator, follow these steps:

**Step 1.** Chassis—First, you need a Cisco 6160 Chassis. The chassis assembly also includes the backplane, DC power entry module (PEM), and fan assembly unit. The Cisco 6160 Chassis ships with an accessory kit that contains user and installation documentation and a rack-mounting assembly kit for 23-inch wide racks.

**Step 2.** Power supply—If you need redundant power protection of the system, you can order an optional second PEM.

**Step 3.** Software—Order the Cisco IOS base system software. The basic Cisco IOS Software provides support for a single Cisco 6160 chassis with up to 256 subscribers and ATM signaling and QoS. Review Cisco IOS Release Notes for specific feature enhancements and minimum system requirements.

**Step 4.** Software options—In addition to the base Cisco IOS Software, several optional software feature packages are available depending on the feature and capabilities needed. These product options are listed here and further described below:

- The Subtending feature license provides the capability to concentrate access traffic from 2 to 13 Cisco 6160s onto a single network (WAN) interface connected to a service provider network.

- The MPLS feature license permits the Cisco 6160 to operate as an MPLS label edge router (LER) and support the creation of MPLS-based VPNs.
- The OpenDSL Proxy feature license provides support of automated configuration of OpenDSL-compliant CPE, greatly simplifying DSL installations.

**Step 5.** System cards—Specify the network interface card (NI-2) and I/O card options for the Cisco 6160. The NI-2 system card provides several major Cisco 6160 functions: It is the Cisco IOS Software processing platform; it contains the system ATM switch fabric; it provides the wide-area ATM network interface; it provides the ATM subtending interfaces; it provides the console and network management interfaces; and it provides the SNMP network management agent functionality. An important note is that if 8xT1 IMA operation is desired, the DS3+T1/E1 IMA NI-2 card (P/N: NI-2-DS3-T1E1) must be ordered with the DS3/2DS3+8xT1 IMA I/O card (P/N: CHAS6160-W/IO-2). The current Cisco 6160 configuration requires at least one NI-2 card. There are, however, two slots in the Cisco 6160 to support a redundant NI-2 card (requires Cisco IOS Software Release 12.1(7)DA).

**Step 6.** Line cards—Configure the Cisco 6160 with DSL line cards. Minimum quantity is 1; maximum quantity is 32.

**Step 7.** POTS splitters (optional)—To include voice telephone support (ADSL and POTS line sharing) with the Cisco 6160 (optional), order POTS splitter equipment through one of Cisco third-party suppliers. Contact a Cisco sales representative for more information.



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