

# Cisco IGX 8400 Series

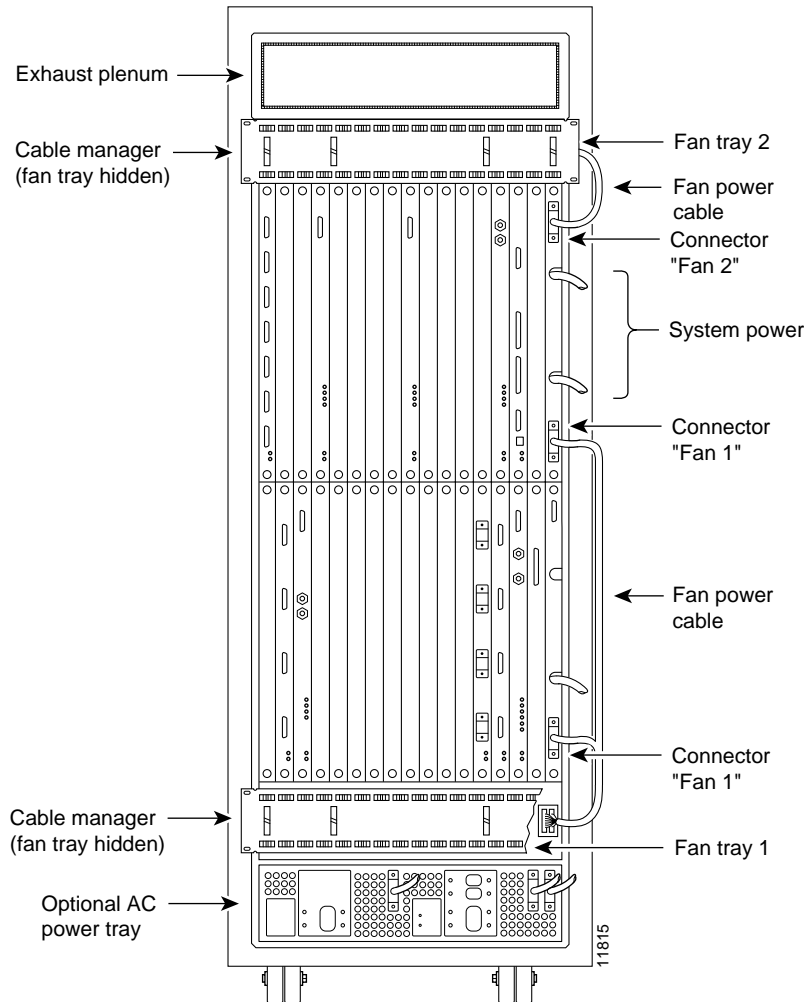
## Product Overview

The Cisco IGX 8400 series is a family of standards-based, scalable ATM switches, which are available in 8-, 16-, or 32-slot versions that can be either standalone or rack mounted. The IGX 8400 series seamlessly integrates with other Cisco products. The three IGX models are listed below:

- IGX 8410, which contains 8 slots
- IGX 8420, which contains 16 slots
- IGX 8430, which contains 32 slots

The following figure shows a rear view of the IGX 32. The rear view of the IGX 16 is identical to the lower stack of the IGX 32 rear view, as shown in the figure below.

Figure 8-2: IGX 32 Rear View



## Key Features and Benefits

The IGX 8400 series switch uses a 1.2-Gbps cell-switching redundant bus to pass ATM cells between optionally redundant adaptation and trunking modules within the system. This architecture allows any amount of bandwidth to be assigned to any slot, and makes the IGX 8400 series switch the only system in its class with more than 16 slots for greater scalability.

Hardware, firmware, and software are designed for maximum availability, even while routine maintenance functions are being performed on the IGX 8400 series switch. Design features common to all switching systems include the following:

- 100 percent component redundancy
- Extensive background diagnostics
- "Hot" card swapping
- Rapid power failure recovery
- Background software download
- Firmware, not hardware, upgrades via remote download
- Class B EMI certified enclosures
- Hard and soft alarm interfaces, including "call home" auto-dial modem features

- Minimum internal cabling
- Integrated grounding wrist straps

All IGX switches use a midplane design with front cards performing processing functions and back cards providing interfacing and physical connectivity. This allows most system maintenance to be performed at the front cards, without disconnecting interface cables.

## Specifications

### Hardware

#### Processor Functions

The IGX 8400 series switch has a processor card group that controls communication between the cards in the node and the system bus. This card group also controls communication to other nodes in the network, and performs system timing, network control, and status reporting functions.

##### Processor Card Group

The processor card group consists of the network processor module, system clock module, and alarm relay module.

- Network processor module (NPM)

The NPM is a microprocessor-based system controller that contains the software for controlling, configuring, and monitoring the IGX switch. The NPM performs the following major functions:

- Runs real-time software for controlling, configuring, diagnosing, and monitoring the IGX 8400 node
- Receives status and alarm messages from the other cards in the node
- Sends configuration and control commands over the control bus to the other cards in the same node
- Generates all system bus control signals for directing the interpretation of address buses and controlling data transfers
- Supports a high-speed Ethernet LAN port (IEEE standard 802.3 for Ethernet) for faster system statistics transfer between the node and a StrataView Plus NMS workstation
- Communicates with other nodes in the network
- The NPM's communication link with other nodes carries information about new connections, topology changes, and rerouting.

- System clock module

The system clock module provides a centralized clock generation function for the IGX 8400 series. Each IGX node must have a system clock module; a single system clock module can support redundant NPMs. The system clock module performs the following major functions:

- Generates the system clock and trunk synchronization clocks
- Phase-locks the internal IGX switch timing to the selected clock source for network synchronization
- Provides connection to network management terminals and modems for remote access to the node via two serial EIA/TIA-232 ports
- Combined with the NPM, provides the backbone of the IGX 8400 switch

The system clock module circuits include the following:

- Clock detection, alarm status, and control from the NPM
- Phase lock loops
- External clock inputs

- Clock, power supply, temperature, fan detection, and fan speed monitoring
- Bus expansion
- Reset circuitry
- Control termination, printer/modem, and LAN AUI ports
- Alarm relay module (ARM)  
The ARM includes visual alarm indication, a set of relay outputs, and an alarm history indication.

## ATM Services

The IGX 8400 series provides ATM services at broadband speeds. You can use the IGX ATM interfaces to support LAN interconnections across the wide area and seamlessly operate across the Cisco product families, while providing high performance through user fairness, high throughput, and low discards.

- Class-of-service support  
Standards-compliant ATM services from IGX 8400 series systems support high-performance CBR, VBR, and ABR connections with their associated classes of service. The IGX switch ATM interfaces use Advanced CoS Management features to guarantee that the appropriate quality of service is maintained at all times.
- Seamless integration  
All IGX 8400 series ATM ports seamlessly integrate with IGX 8400 series, BPX 8600 series, and MGX 8220 ports. You can easily provision connections across all the Cisco products to enable the best switching infrastructure for any environment. ATM connections can traverse both broadband and narrowband trunks. Integrated connections support traffic management and congestion control techniques and Advanced CoS Management.
- Fair, high performance  
All IGX 8400 series ATM port types support traffic management features. User firewalling with per-virtual-circuit queuing and rate scheduling for high performance and management of fairness among users is also supported.
- ATM line module  
The ATM line module supports the following:
  - Unchannelized T3/E3, ATM UNI (3.0,) or trunk (45-Mbps throughput)
  - CBR, VBR
  - Deep buffering (64,000 cells of buffering for advanced traffic management support)
  - Up to 1500 connections per card

## Frame Relay Services

Standards-compliant Frame Relay services from IGX 8400 series systems achieve high-throughput, low-delay, and low-discard connectivity for LAN interconnect and legacy FRAD traffic. Port speed options range from 56 kbps to 2.048 Mbps. A port concentrator shelf (PCS) can be used in conjunction with the IGX switch for higher-density, lower-speed Frame Relay ports. (For more information on the PCS, see the “Port Concentrator Shelf” section later in this chapter.) Standard interfaces include V.35, X.21, and channelized T1 and E1 for up to 31 logical ports per physical port.

Frame Relay services on the IGX 8400 series include the following features:

- Full standards compliance  
All IGX 8400 series Frame Relay port types conform to all aspects of the nonswitched Frame Relay services (PVC services) defined in ANSI T1.606/607/617/618 and CCITT I.122/Q.933 standards, and support a full implementation of the Local Management Interface (LMI) and enhancements incorporated in ANSI and ITU standards. Discard eligible,

forward explicit congestion notification (FECN), and backward explicit congestion notification (BECN) bit handling conform to all standard definitions. ISDN access is supported in conjunction with the dial access server. For more information on the dial access server, see the “Cisco Voice Network Switching System” chapter.

- Fair, high performance

All IGX 8400 Series Frame Relay port types are capable of supporting the ForeSight traffic management and congestion avoidance algorithm and per-virtual-circuit queuing and rate scheduling for high performance and management of fairness among users.

- Seamless integration

All IGX 8400 Frame Relay ports seamlessly integrate with IGX 8400 series, BPX 8600 series, and MGX 8220 Frame Relay ports. Integrated connections support optimized bandwidth management and advanced CoS management.

- Frame forwarding

IGX 8400 series Frame Relay ports support frame forwarding for efficient transport of HDLC- (for example, X.25) or SDLC-framed traffic over Frame Relay on all port types at speeds up to 2.048 Mbps.

- Frame Relay service modules

The Universal Frame Relay Module (UFM) series of cards provides high-density, high-throughput Frame Relay interfaces. The Universal Frame Relay Channelized Module (UFM-C) offers either 4- or 8-T1/E1 ports per card (channelized or unchannelized). The Universal Frame Relay (UFM-U) module offers a 16 Mbps-per-card throughput. A 12-port V.35 or X.21 card and a 4-port HSSI card is available. Each card can support up to 1000 virtual connections.

The Frame Relay service module (FRM) offers port speeds of up to 2.048 Mbps/card; interface back cards for T1/E1 x 1, V.35, X.21; channelized or unchannelized T1/E1; bundled connections; frame forwarding; explicit congestion notification; ForeSight dynamic congestion avoidance; and up to 252 virtual-circuit process capability.

## Port Concentrator Shelf

The IGX 8400 series port concentrator shelf (PCS) dramatically increases the Frame Relay port capacity and speed range of the IGX 8400 series switch. A fully loaded PCS expands the capacity of each IGX Frame Relay card to support 11, 22, 33, or 44 ports with a wide range of sub-T1/E1 port speeds.

The modular PCS hardware lets you tailor each IGX 8400 series node for specific applications. Modules are available with V.24/V.28, V.11, or V.35 DCE and/or DTE interfaces. For applications requiring multiple types of interfaces, interface daughter boards can be mixed and matched on a per-interface basis. You can insert up to four PCS modules into a PCS shelf. Modules can be hot-swapped without affecting service to other ports on the shelf.

PCS ports offer the following features:

- Conformance to all ANSI T1.606/.607/.618 and CCITT I.122/Q.933 standards
- Full implementation of Local Management Interface (LMI)
- Enhancements incorporated in ANSI and ITU standards
- Integrated frame forwarding for efficient transport of SDLC- or HDLC-framed traffic over Frame Relay on all port types at speeds up to 384 kbps

## Voice Services

IGX 8400 series provide efficient, high-quality voice connectivity to digital PABX through standard interfaces. The IGX 8400 series is the industry's first ATM switch with voice using both voice compression and silence suppression. The following voice services are supported by the IGX 8400 series switch:

- Voice compression

Adapter differential pulse code modulation (ADPCM) and low-delay code excited linear prediction (LD-CELP) mathematically compress voice signals for two- to fourfold savings over uncompressed voice traffic. When combined with voice activity detection, up to 8:1 compression can be achieved.

- Voice activity detection—ATM voice adaptation

Voice activity detection uses the latest digital signal processing techniques to distinguish between silence and speech on a voice connection. Voice activity detection only generates traffic (cells) onto the network during speech, so typically achieves at least a two-to-one savings. This is possible because most voice conversations are 60 percent silence; one person listens while the other person speaks, and speakers usually pause between sentences. Together,

ADPCM/LD-CELP and voice activity detection over ATM achieve up to eight-to-one savings over uncompressed voice traffic.

- Standard voice switching

Voice switching between PBXs using standard common channel signaling (CCS) protocols or Channel-associated signaling protocols can be achieved with the Voice Network Switching (VNS) system. With this feature, each voice channel is dynamically routed on a per-call basis, and advanced PBX features such as transfer and camp-on are extended across the network, even if trunking is achieved through an ATM cloud. This provides better resource utilization, better voice quality, and lower costs than a typical tandem switched network. (For more information, see the “Cisco Voice Network Switching System” chapter.)

- Fax and modem services

IGX 8400 series voice services transparently support facsimile and modem communications by disabling or stepping-down compression. As with voice transmission, this technique ensures efficient, high-quality transmission.

- Voice service modules

Channelized voice modules (CVMs) and universal voice modules (UVMs) are available for the IGX switch with E1, T1, or J1 interfaces. Voice activity detection (VAD), which provides silence suppression, is also standard on these interfaces. Optional call switching is available. CVM provides 32K, 24K, and 16K ADPCM compression. UVM provides 32K, 24K ADPCM, and 16K LD-CELP compression.

The channelized voice module operates with either a T1 (BC-T1), E1 (BC-E1) or J1 (BC-J1) back card. This module can be used for voice traffic, data traffic, or a combination of both. It provides a-law to m-law conversion and voice compression capability, as well as channelized data (up to 8 DS-0 bundles). Echo cancellation is an optional feature.

The UVM can be used for voice traffic, data traffic, and a combination of both. For voice compression using ADPCM, the UVM can operate in either 24-channel mode (T1) or 30-channel mode (E1 and J1.) If the compression is LD-CELP, the UVM supports 16 channels, but can pass the remaining DS-0s on a T1, E1, or J1 line to another UVM for processing. The UVM provides 32 ms integral echo cancellation for all voice channels. With Release 8.5, the UVM supports channelized data (up to 8DS-0 bundles).

The UVM can terminate connections to another UVM or a CVM. Compatibility allows a mixed network of all voice modules, thus optimizing a customer’s investment. The UVM back cards are the BC-UVI-2TIEC, BC-UVI-2EIEC, and BC-UVI-2JIEC.

## **Circuit-Switched Data Services**

Circuit-switched data services on the IGX 8400 series switch include the following features:

- Transparent data service

IGX systems provide circuit-switched data connectivity for legacy data transport through transparent, fixed delay, fixed throughput, zero discard point-to-point data connections over ATM. Speed options range from 1200 bps to 2.048 Mbps (asynchronous from 1.2 kbps to 19.2 kbps) using standard EIA/TIA-232, V.35, X.21, T1, and E1 interfaces. The IGX supports both dedicated port and channelized circuit emulation (from voice service circuit interfaces).

- Flexible clocking

The IGX 8400 series includes options for external or internal clocking on a port-by-port basis. The “software break-out box” feature allows the Electronics Industries Association (EIA) control leads on any data port of any node in the network to be viewed and manipulated in real time from the StrataView Plus network management console.

- Repetitive pattern suppression—circuit data compression

The IGX 8400 series provides for suppression of repetitive patterns like idle flag conditions in SDLC and HDLC protocols. Repetitive pattern suppression increases efficiency of data connections up to 128 kbps. This algorithm effectively compresses data by up to four times by removing repetitive patterns such as “7E” flags sent by devices when they have no new traffic. Repetitive patterns are reproduced at the far end of repetitive pattern suppression connections, so connected devices remain unaffected.

- **Circuit-switched data service modules**

Circuit-switched data services include the low-speed data module (LDM), the high-speed data module (HDM), the channelized voice module (CVM), and the universal voice module (UVM).

— The LDM includes a programmable communications processor, up to eight data ports, support for EIA/TIA-232 ports, data ranges up to 19.2 kbps per port, asynchronous or synchronous data support, and a low-speed data interface back card for physical and electrical connection interface support.

The HDM includes a programmable communications processor; up to four data ports; one to four high-speed data channels that support V.35, X.21, V.36, EIA/TIA-449, and EIA/TIA-422; synchronous data protocol support; speeds from 1.2 kbps to 1.344 Mbps on all ports; error link monitoring; and a synchronous data interface back card that provides direct connection to the HDM physical and electrical interface.

The CVM includes a dual-purpose front card; termination of T1, E1, or J1 circuit line (communication line to CPE); circuit line use for voice or data traffic alone or a combination of voice and low-speed/high-speed data; channelized data input support including 8 DS-0 per bundle and 56/64 x n data rates; full T1/E1 support with TDM transport license; and DS-0(A) support.

The UVM can be used for voice or data traffic alone or a combination of voice and high-speed data; channelized data input support including 8 DS-0s per bundle.

## Trunk Resources

The IGX 8400 series trunk modules include the network trunk module, broadband ATM trunk module, ATM line module, and Frame trunk module.

- **Network trunk module (NTM)**

The NTM coordinates the transmission of FastPackets across a trunk line to another Cisco node and offers cell-switched narrowband trunking with Advanced CoS Management, low delay over narrowband trunks, extraction of clocking from the trunk, and trunk usage statistics collection.

The NTM works with the T1 interface card (BC-6271A-T1), E1 interface card (BC-6171A-E1), Y1 interface card (BC-550150-Y1), subrate interface card for unframed transmission services (BC-6083A-SR), and full or fractional service configurable back cards.

- **Broadband ATM trunk module (BTM)**

The BTM provides a broadband trunk interface enabling the IGX 8400 series to use a standard ATM cell relay protocol over T3/E3 trunks and to support E3, T3, E2, and HSSI; trunk rates as low as one T1/E1 rate; migration up to T3/E3 rates in T1/E1 increments with minimal downtime for traffic rerouting; a BTM front card and either a BC-571110A-T3, BC571210A-E3, BC-571310A-E2, or BC-571410A-HSSI back card; full CCITT ATM compliance.

- **ATM line module (ALM/B)**

The ALM/B provides an ATM trunk and offers T3/E3 support, BC-UA1-1T3 or BC-UA1-1E3 back card usage, full CCITT ATM compliance, and alternative portside interface.

- **Frame trunk module (FTM)**

The FTM provides Frame device connection and includes a Frame back card with T1, E1, V.35 X 4, or X.21 X 4 interfaces; up to 512 kbps per Frame; and Frame Relay service compatibility.

## Intelligent QoS Management Suite

- Automatic Routing Management

Formerly AutoRoute. Cisco WAN switches use a connection-oriented mechanism to provide connectivity across the network. The switches perform a Connection Admission Control (CAC) function on all types of connection in the network. Distributed network intelligence enables the CAC function to automatically route and reroute connections over optimal paths while guaranteeing the required QoS.

- Advanced CoS Management

Formerly FairShare and OptiClass. Class-of-service management is essential of delivering the required QoS to all applications. Cisco switches contain per-virtual -circuit (VC) queuing, per-VC-rate scheduling, multiple class-of-service queuing, and egress queuing. This enables managers to refine connections to meet specific application needs.

- Optimized Bandwidth Management

Cisco wide-area switches ensure fair and cost-efficient bandwidth utilization using various techniques. Available bit-rate (ABR) and ForeSight are used for ATM and Frame Relay traffic. ABR is a standards-based ATM traffic management mechanism, and ForeSight is Cisco's implementation that mirrors ABR capabilities for Frame Relay traffic. ABR and ForeSight optimize real-time traffic performance and throughput and minimize data loss. Bandwidth management for voice is achieved through the use of standards-based compression and silence suppression mechanisms for circuit data services.

- Dynamic Buffer Management

Cisco's Frame Relay and ATM service module are equipped with large buffers and a patented dynamic buffer management scheme for allocating and scaling them on a per-VC basis to traffic entering or leaving a node. The switch dynamically assigns buffers to individual virtual circuits based upon the amount of traffic present and service level agreements. This deep pool of available buffers readily accommodates large bursts of traffic in the node.

**Table 8-13: IGX 8400 Series Specifications**

Characteristic	Description
Platforms	IGX 8410
	8-slot unit, rack-mount or freestanding
	1.2-Gbps cell switching bus
	CISPR B EMI certified
	IGX 8420
	16-slot unit, rack-mount or freestanding
	1.2-Gbps cell switching bus
	CISPR B EMI certified
	IGX 8430
	32-slot unit, rack-mount or freestanding
Power	Distributed 48V DC power conversion on modules
	220/240 VAC AC-DC converter, 1:n redundant
Control processors	Network processor module (NPM)
	System clock module, internal or external clocking
Alarm modules	Alarm relay module (ARM)
	8 normally open contacts
	6 normally closed contacts



Characteristic	Description
Voice service modules	Channelized voice and data module (CVM) 32-, 24-, and 16-kbps ADPCM voice compression (ITU G.721, G.723, and G.726) Voice activity detection Integrated FAX/high-speed modem detection and optional echo cancellation Supports T1, E1, J1 interfaces Universal voice module (UVM) 32-Kbps, 24-Kbps ADPCM and 16-Kbps LD-CELP voice compression (ITU G.721, G.723, and G.728) Voice activity detection On board echo cancellation Fax and modem tone detection Supports T1, E1, and J1 interfaces
Circuit switched data service modules	High-speed data module (HDM) Up to 4 channels, each up to 1.344 Mbps Supports EIA/TIA-232, V.35, EIA/TIA-422, EIA/TIA-449, and X.21/V.36 interfaces Repetitive pattern suppression to 128 kbps Low-speed data module (LDM) Up to 8 channels Supports EIA/TIA-232 interface Repetitive pattern suppression to 56 kbps
Frame Relay service modules	All Frame Relay service modules conform to the following: CCITT 1.122 (ANSI T1/S1) T1.606—Services description of Frame Relay bear service T1.606 addendum—Congestion management T1.617 (Annex D)—Signaling specification for Frame Relay T1.618—Core aspects of Frame Relay Includes fully standard handling of DE, FECN, and BECN bits Frame Relay module (FRM) Up to four channels, totaling 2.048 Mbps Supports V.35, EIA-TIA/422, EIA/TIA-449, X.21/V.36, and T1/E1 (channelized and nonchannelized) interfaces Frame Relay module (FRM-31) Up to 31 logical ports Frame Relay module (FRM-2) T1/E1 (channelized and nonchannelized) interfaces X.21 1/f for port concentrator shelf Universal Frame Relay module (UFM-C) 8 ports T1/E1 (channelized or unchannelized) Universal Frame Relay module (UFM-U) Supports 12 V.35/X.21 ports per card Supports four HSSI ports per card
ATM service module	ATM line module (ALM/A) Supports unchannelized T3/E3 with 45 Mbps throughput UNI 3.0 portside interface CBR, VBR, and CoS support 64,000 cells of buffering Supports up to 1500 connections per card

Characteristic	Description
Network trunking modules	<p>Network trunking front module (NTM)</p> <p>Trunk speeds from 128 kbps to 2.048 Mbps</p> <p>Supports T1/E1, Japanese J1 trunk interfaces</p> <p>Broadband ATM trunk module (BTM)</p> <p>ITU 53-byte cell standard</p> <p>Supports T3/E3 and HSSI interfaces</p> <p>Multipoint logical trunking over ATM service</p> <p>ATM Line module (ALM/B)</p> <p>Supports unchannelized T3/E3 with 45-Mbps throughput</p> <p>Full CCITT ATM compliance</p> <p>Frame trunk module (FTM)</p> <p>FastDLC, FrameClass, Frame Relay service compatible, protocol</p> <p>Frame trunk speeds from 9.6 kbps to 512 kbps</p> <p>Supports V.35, T1, E1, and X.21 interfaces</p>

## Software

This section describes the software available for the IGX 8400 series switch.

### System Software

The IGX 8400 series requires system software for each node. Table 14-16 lists the system software product numbers. Optional software packages include the following:

#### Standard System Software

- System software license 7.2.81
- System software license 8.1.2
- System software license 8.2.0
- System software license 8.2.3
- System software license 8.2.5
- System software license 8.4.0
- System software license 8.5.0
- Applicable ForeSight license for Frame Relay modules

#### Optional Software

- Repetitive pattern suppression software license
- TDM transport license per CVM or CDP card
- Configuration and restore software license
- Multiuser configuration sessions

### Management Software

The IGX 8400 series is supported by Cisco's StrataView Plus management tools.

StrataView Plus network management provides the unique capabilities required for managing ATM WANs. StrataView Plus distributes the logical management intelligence is distributed throughout the network through a set of building blocks, or modules. By distributing network management functionality, service management and process automation can be tightly integrated—simplifying management of even the most complex WANs and providing a comprehensive end-to-end management solution.

StrataView Plus is an SNMP-based multiprotocol management environment designed specifically for ATM WANs. It provides integrated service management and process automation to simplify management of even the most complex networks. StrataView Plus lets you easily monitor usage, provision connections, prototype services, optimize traffic flow, model network design, and track network statistics.

## Product Numbers

### Part Numbers

Description	Part Number
<b>IGX 8400 Series Base Systems</b>	
IGX 8410, 8-slot, rack-mount NPM, system clock module, AC or DC power	IGX8-RM
IGX 8410, standalone, NPM, system clock module, AC or DC power	IGX8-SA
IGX 8420, 16-slot, NPM, system clock module, AC or DC power	IGX16-RM
IGX 8420, standalone, 16-slot, NPM, system clock module, AC or DC power	IGX16-SA
IGX 8430, 32-slot, NPM, system clock module, AC or DC power	IGX32-RM
IGX 8430, standalone, 32-slot, NPM, system clock module, AC or DC power	IGX32-SA
<b>IGX 8400 Series Processor Group</b>	
Network processor module—32-MB DRAM	IGX-NPM-32
Redundant network processor module—32-MB DRAM	IGX-NPM-32-R
Network processor module—32-MB DRAM (spare)	IGX-NPM-32=
Network processor module—64-MB DRAM	IGX-NPM-64
Redundant network processor module—64-MB DRAM	IGX-NPM-64-R
Network processor module—64-MB DRAM (spare)	IGX-NPM-64=

Description	Part Number
System clock module with Ethernet and LEC back card	IGX-SCM
System clock module with Ethernet and LEC back card (spare)	IGX-SCM=
<b>IGX 8400 Series Alarm Relay Group</b>	
Alarm relay module	IGX-ARM
Alarm relay interface back card	BC-512011
<b>IGX 8400 Series Trunk Groups</b>	
ATM line module	IGX-ALM/B
T3 back card for ATM line module	BC-UA1-1T3
E3 back card for ATM line module	BC-UA1-1E3
Broadband trunk module	IGX-BTM/B
T3 back card for broadband trunk module	BC-571110A-T3
E3 back card for broadband trunk module	BC-571210A-E3
E2 back card for broadband trunk module	BC-571310A-E2
HSSI back card for broadband trunk module	BC-571410A-HSSI
Network trunk module	IGX-NTM
Back card/T1 (BC-T1)	BC-6271A-T1
Back card/subrate (BC-SR)	BC-6083A-SR
Back card/E1 (BC-E1)	BC-6171A-E1
Back card/Y1 (BC-Y1)	BC-550150-Y1
FastPad trunk module	IGX-FTM
<b>IGX 8400 Series Port Groups</b>	
ATM Line module - UNI	IGX-ALM/A
T3 back card for ATM line module - UNI	BC-UAI-1T3
E3 back card for ATM line module - UNI	BC-UAI-1E3
Universal Frame Relay module, unchannelized	IGX-UFM-U

Description	Part Number
Back card/12-port V.35	BC-UFI-12V35
Back card/12-port X.21	BC-UFI-12X21
Back card/4-port HSSI	BC-UFI-4HSSI
Universal Frame Relay module/4 ports channelized	IGX-UFM-4C
Universal Frame Relay module/8 ports channelized	IGX-UFM-8C
Back card/8-port T1	BC-UFI-8T1-DB15
Back card/8-port E1-BNC	BC-UFI-8E1-BNC
Back card/8-port E1-DB15	BC-UFI-8E1-DB15
Frame Relay module	IGX-FRM
Frame Relay module, 31 channels for the IGX 16 and IGX 32	IGX-FRM-31
Frame Relay module for use with port concentrator shelf	IGX-FRM-2
Frame Relay interface (FRI-V.35) for FRM	BC-6251B-V35
Frame Relay interface (FRI-T1) for FRM-31	BC-6252A-T1
Frame Relay interface (FRI -E1) for FRM-31	BC-6253A-E1
Frame Relay interface (FRI-X.21) for FRM	BC-6254A-X21
Frame Relay interface X.21 back card for FRM-2 and PCS	BC-6355A-X21
Universal voice module	IGX-UVM
Back card/2TIEC	BC-UVI-2TIEC
Back card/2EIEC	BC-UVI-2EIEC
Back card/2JIEC	BC-UVI-2JIEC
CVM ADPCM with integrated T1 echo canceler	IGX-CVM-T1IEC

Description	Part Number
CVM ADPCM with integrated E1 echo canceler	IGX-CVM-E1EC
Channelized voice module ADPCM	IGX-CVM
Back card/E1 (BC-E1)	BC-6171A-E1
Back card/T1 (BC-T1)	BC-6271A-T1
Back card/J1 (BC-J1)	BC-550100-J1
High-speed synchronous data module	IGX-HDM
HDM back card/RS232D (SDI-RS232D)	BC-5084B-RS232
HDM back card/V.35 (SDI-V.35)	BC-5082A-V35
HDM back card /RS449 (SDI-RS449)	BC-5083A-RS449
Low-speed data module	IGX-LDM
LDM back card/4-port/RS232C (LDI4)	BC-5286A-RS232
LDM back card/8-port/RS232C (LDI8)	BC-5287A-RS232
<b>IGX 8400 Series Port Concentrator</b>	
<b>Shelf</b>	
110V, 44-port PCS unit with V.28 interfaces	PCS-NA-S-V28
110V, 44-port PCS unit with V.11 interfaces	PCS-NA-S-V11
110V, 44-port PCS unit with V.35 interfaces	PCS-NA-S-V35
220V, 44-port PCS unit with V.28 interfaces	PCS-INTL-S-V28
220V, 44-port PCS unit with V.11 interfaces	PCS-INTL-S-V11
220V, 44-port PCS unit with V.35 interfaces	PCS-INTL-S-V35
240V, 44-port PCS unit with V.28 interfaces	PCS-UK-S-V28

Description	Part Number
240V, 44-port PCS unit with V.11 interfaces	PCS-UK-S-V11
240V, 44-port PCS unit with V.35 interfaces	PCS-UK-S-V35
PCS shelf only with 110 VAC power supply	PCS-NA
PCS shelf only with 220 VAC power supply	PCS-INTL
PCS shelf only with 240 VAC power supply	PCS-UK
48VDC PCS Shelf	PCS-DC
PCS module with 1 V.11 and 11 V.28 interfaces	PCS-V28
PCS module with 12 V.11 interfaces	PCS-V11
PCS module with 1 V.11 and 11 V.35 interfaces	PCS-V35
EIA/TIAM25—RS-232/M25 cable	CABLE-V28
EIA/TIAM25—X.21/V.11 DB15/M cable	CABLE-V11
EIA/TIAM25—V.35/M34 cable	CABLE-V35
EIA/TIAM25—V.35/M34 cable	CABLE-SPV35
EIA/TIAM25—RS-422/M37 cable	CABLE-X21DTE
EIA/TIAM25—RS-422/M37 cable	CABLE-X21DCE
<b>IGX 8400 Series Power Cords</b>	
IGX 8410 power cord, 8 ft 125V/15A (North America)	CAB-217994
IGX 8410/8420/8430 power cord with CEI 23 16/V11 plug	CAB-590071
IGX 8410/8420/8430 power cord with CEE 7/7 plug	CAB-590072
IGX 8410/8420/8430 power cord with AS 3112 plug	CAB-590073

Description	Part Number
IGX 8410/8420/8430 power cord with BS 1363 plug	CAB-590074
IGX 8410/8420/8430 power cord with NEMA L6-20 twistlock plug	CAB-590076
<b>IGX 8400 Series Spares and Accessories</b>	
400W power supply module for the IGX 8	IGX8-PS-AC
Single AC input power option rack	IGX8-AC1
Dual AC input power option rack	IGX8-AC2
Single AC 875W power supply; single AC input (nonredundant)	IGX16-AC1-1
Dual AC 875W power supply; single AC input (redundant)	IGX16-AC2-1
Dual AC 875W power supply; dual AC input (redundant)	IGX16-AC2-2
Dual AC 875W power supply; single AC input (nonredundant)	IGX32-AC2-1
Quad AC 875W power supply; dual AC input (redundant)	IGX32-AC4-2
Additional 875W AC power supply for the IGX 16 or IGX 32	IGX-PS-AC
DC power option nonredundant for the IGX 8	IGX8-DC-1
DC power option redundant for the IGX 8	IGX8-DC-2
Power entry module - DC for the IGX 16 and IGX 32	IGX-PEM
IGX 8410 cooling unit and fan tray (spare)	IGX8-COOL=
IGX 8420 or IGX 8430 upper cooling unit (spare)	IGX-UCOOL=
IGX 8420 or IGX 8430 lower cooling unit (spare)	IGX-LCOOL=



Description	Part Number
IGX 8400 series cable set; includes the three required power supply cables for 1 or 2 shelves (spare)	IGX-CABSET=
Exhaust plenum for the IGX 16 or IGX 32 (spare)	IGX-PLENUM=
PEM back card—DC for the IGX 16 or IGX 32 (spare)	IGX-PEMBC=
System clock module/NPM local (utility) bus (spare)	IGX-BUS=
<b>IGX S8400 Series Software Licenses</b>	
System software license 7.2.81	IGX-SW-7286
System software license 8.1.2	IGX8-SW-812
System software license 8.1.2	IGX-SW-812
System software license 8.2.0	IGX-SW-820
System software license 8.2.3	IGX-SW-823
System software license 8.2.5x	IGX-SW-825
System software license 8.4.0	IGX-SW-840
<b>IGX 8400 Series Feature Licenses</b>	
Frame Relay ForeSight software license per FRM	IGX-FS-1
Frame Relay Foresight software license for UFM	IGX-FS-UFM
Repetitive pattern suppression software license for the IGX 16 and IGX 32	IGX-LIC-RPS
TDM transport license to convert CVM to CVM-TT	IGX-TT
Configuration save and restore software license	IGX-LIC-CSR
Multiuser configuration sessions	IGX-LIC-MUC
<b>StrataView Plus Management Software</b>	

Description	Part Number
StrataView Plus, HP OpenView, StrataSphere Service Agent (Sun), Statistics Agent, StrataSphere Modeler, StrataSphere Adapter, StrataSphere upgrades	See the “Cisco StrataView Plus ATM Network Management” chapter.