



# Intel® NetStructure™ PBX-IP Media Gateway

Migrate to IP while protecting your legacy telecommunications equipment investment



## Features and Benefits

Protects investment in legacy telecommunications equipment and allows a controlled migration to IP technology

Gateway units available with either digital network interfaces for connection to a legacy PBX (emulating) or digital station interfaces for connecting to legacy digital phones (phone driving)

An analog loop start unit (emulating) can connect to PBXs that do not have an appropriate digital interface

The digital network interface units (emulating) act as a gateway to cost-effectively IP-enable an existing PBX, allowing communication between a circuit-switched telephony network and H.323 or session initiation protocol (SIP) compatible remote devices such as IP voice mail and unified messaging applications, IP phones, wireless IP phones, and soft phones

The digital station interface unit (phone driving) allows IP-PBXs and applications to control legacy digital handsets, thus protecting an investment in these phones while migrating some or all of the core switching architecture to IP

Suitable for small to medium enterprises

Easy to install, configure, and maintain

Compatible with a variety of Nortel, Avaya, Siemens, NEC, and Mitel PBX and handset models

Choice of standards-based ITU H.323 or standards-based SIP per Draft-IETF-SIP-RFC2543bis-05

Uses standards-based coders including G.711 A-law and  $\mu$ -law, G.723.1, and G.729A

Provides fax support in which emulating units transcode fax from T.30 fax protocol, supporting V.21, V.27, V.29, and V.17 modulation schemes, to T.38 for transmission over a packet network

### Supports

- SNMP, Web GUI with context sensitive Help facility, Telnet
- Hot swap capability
- Configuration of backup SIP proxy
- Dynamic host configuration protocol (DHCP) for IP address configuration

Phone-driving units can route local and 911 calls to a local trunk gateway or other local server

Synergy with other Intel® products

The Intel® NetStructure™ PBX-IP media gateway allows a well-planned, phased migration to an IP network, making it a smart solution for enterprises not yet ready or willing to completely abandon their investment in legacy PBX equipment. Connected between a PBX or a digital handset and a LAN, WAN, or managed packet network, the gateway converts proprietary digital PBX messages into a format suitable for transmission over standard IP networks. With a PBX, the gateway is used for emulation; with a digital handset, the gateway is used for phone driving.

Each gateway unit contains eight digital PBX (emulating) or digital station interfaces (phone driving) and a 10/100 BaseT Ethernet connection for connecting to a LAN. An analog loop start unit designed for voice mail and unified messaging applications is also available to connect to PBXs that do not have an appropriate digital interface. The analog loop start unit supports several serial protocols for integrating IP applications to PBXs that support the SMDI, MCI, or MD110 protocols.

The gateway is an Intel building block that provides a simple, cost-effective transition to voice and data convergence for enterprises with PBXs. Connected externally, it offers an IP solution that works with current legacy equipment. It supports H.323 or SIP-based applications with fax running on network servers, remote terminals, or other devices.

Specific PBX digital network interface (emulating) gateway units are compatible with the PBXs listed in Table 1. Units are specified by Item Market Name for convenient ordering.

Gateway Item Market Name	PBX Manufacturer	PBX Model
PIMG80MTLDNIV4	Mitel Networks	SX-200, SX-2000
PIMG80DNIV4	Nortel Networks	Meridian* 1, Norstar*
	Avaya Communication	DEFINITY* G3, Merlin Magix*
	NEC	2400 IMX, 2400 IMG, NEAX* 2000
	Siemens	Hicom* 300 series (North American software only)
PIMG80LGNDNIV4	Avaya Communication	Merlin Legend*
PIMG80LSV4	Various	Various models that support analog loop start station interfaces

**Table 1: PBX Digital Network Interface (Emulating) PBX Compatibility**

Cables are not included. Each unit requires one Ethernet cable per unit and one RJ-11 cable per PBX channel.

### Applications

- IP-enabled PBX network
- Voice over Internet Protocol (VoIP) extension to branch offices
- Centralized VoIP and FoIP applications servers, including IP-based voice mail and unified messaging

The PBX digital station interface (phone driving) gateway units support the digital handsets listed in Table 2.

Gateway Item Market Name	PBX Digital Phone Manufacturer	Supported Digital Phone Models
PIMG80DSIV4	Nortel Networks	M2000 and M7000 series
	Avaya Communication	6400, 8400, and 4400 series
	NEC	Dterm* III and Dterm E series
	Siemens	Optiset* E series
PIMG80LGNDIV4	Avaya Communication	MLX series

**Table 2: PBX Digital Station Interface (Phone Driving) PBX Compatibility**

Cables are not included. Each unit requires one Ethernet cable per unit and one RJ-11 cable per PBX channel.

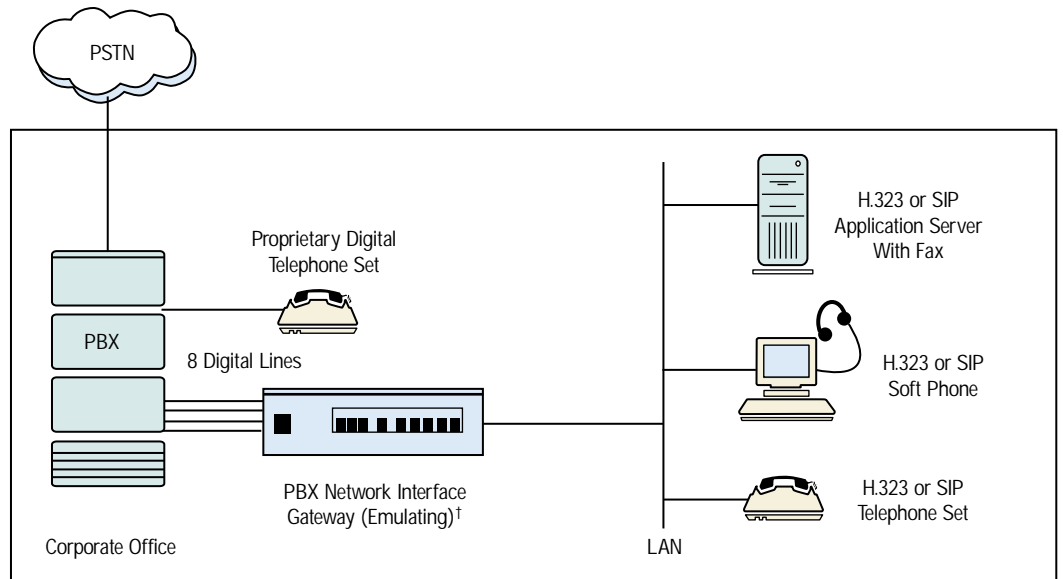
Gateway unit features include:

- **VoIP support** – supports ITU H.323 v3, H.450 supplementary services (including H.450.2/4/7, call transfer/call hold/message waiting indicator), and SIP per Draft-IETF-SIP-RFC2543bis-05. Uses Real-Time Transport Protocol/Real-Time Control Protocol (RTP/RTCP) for delivery of voice over the LAN or WAN.
- **Enhanced Voice Processing** – supports a variety of compression algorithms, including G.711 A-law and m-law, G.723.1, and G.729AB
- **T.38 Fax over IP** – emulating units transcode fax from T.30 fax protocol, supporting V.21, V.27, V.29, and V.17 modulation schemes, to T.38 for transmission over a packet network
- **Hot Swap** – allows gateway units to be added or removed without affecting other gateway units
- **Web server interface** – each gateway unit is delivered with a Web server interface, allowing configuration and software upgrades via a Web browser.

### Configurations

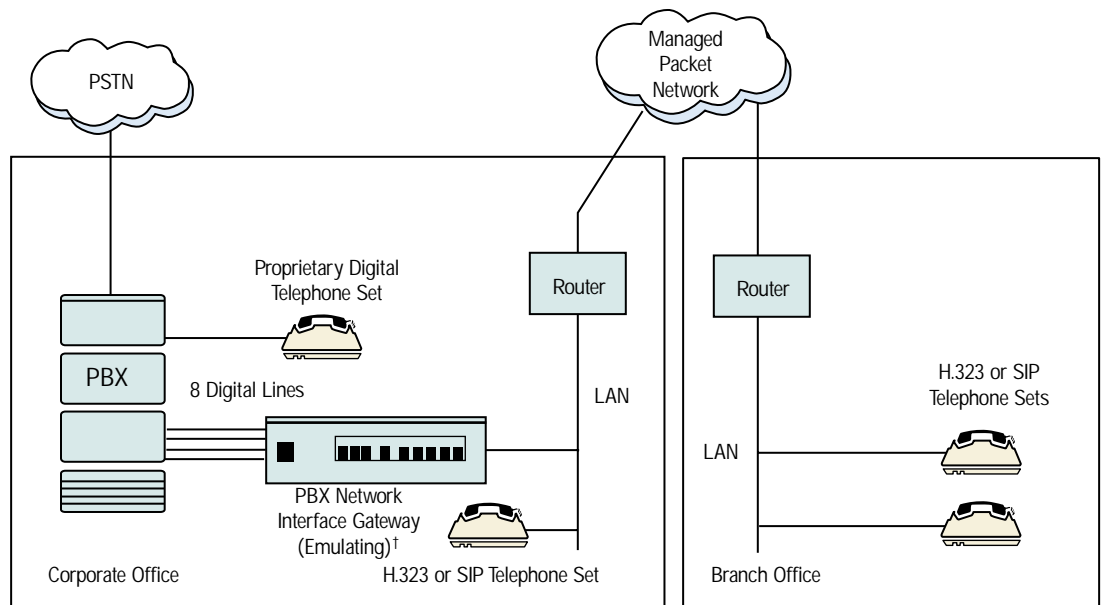
The PBX-IP media gateway can be used to connect IP telephones to a legacy PBX, integrate network-hosted applications with the PBX, extend the PBX to branch offices, and integrate various voice and call processing capabilities in an enterprise LAN or WAN environment. With both a PBX network interface (emulating) version and a PBX station interface (phone driving) version, the PBX-IP media gateway has the flexibility to control either new IP phones or existing legacy digital PBX-compatible phones, thus protecting an investment in legacy telecom equipment by supplying a variety of migration paths to IP telephony.

Figures 1, 2, and 3 provide illustrations of several configurations.



†Intel® NetStructure™ PBX-IP Media Gateway

Figure 1: IP-Enabled PBX in Communication with H.323 or SIP Devices over a LAN



†Intel® NetStructure™ PBX-IP Media Gateway

Figure 2: IP-Enabled PBX in Communication with H.323 or SIP Devices at a Branch Office over a WAN

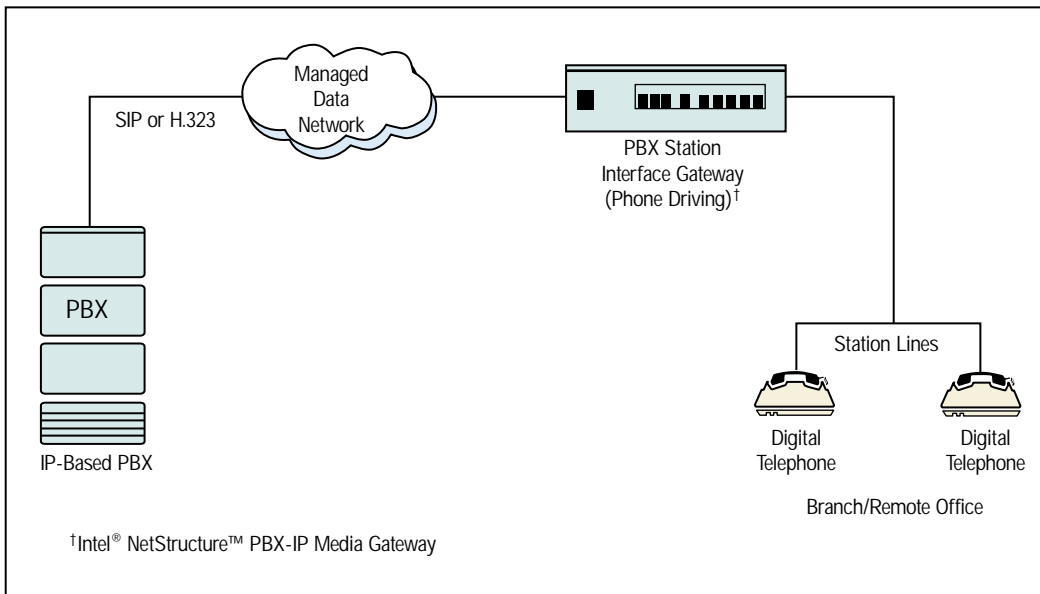


Figure 3: PBX-IP Media Gateway Driving Legacy Digital PBX phones over a LAN or WAN

### Call Routing

Using the gateway, calls can be routed from the PBX network to a destination address on the IP network. Conversely, calls from the IP network can be routed over a PBX port to a destination telephone number on the PBX network. The units supporting PBX digital network interfaces (emulating) and the analog loop start unit support two modes of call routing: point-to-point and pooled.

### Point-To-Point Routing

In point-to-point routing, each gateway port is assigned to a corresponding IP terminal. With this configuration, the only IP terminals that can originate or receive calls through the gateway are those assigned a gateway port. As indicated in Figure 4, each gateway port is assigned to an IP address associated with an H.323 or SIP terminal device on the IP network. Point-to-point routing must be used if there is no H.323 gatekeeper or SIP proxy on the IP network.

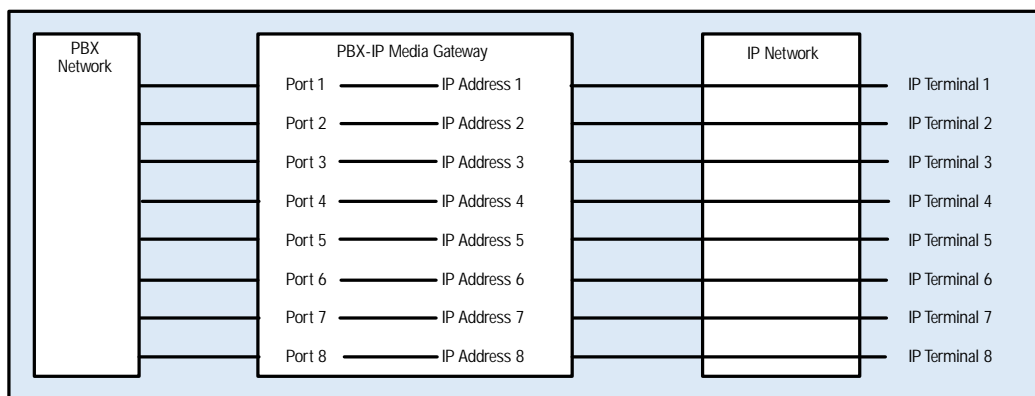


Figure 4: Point-to-Point Routing

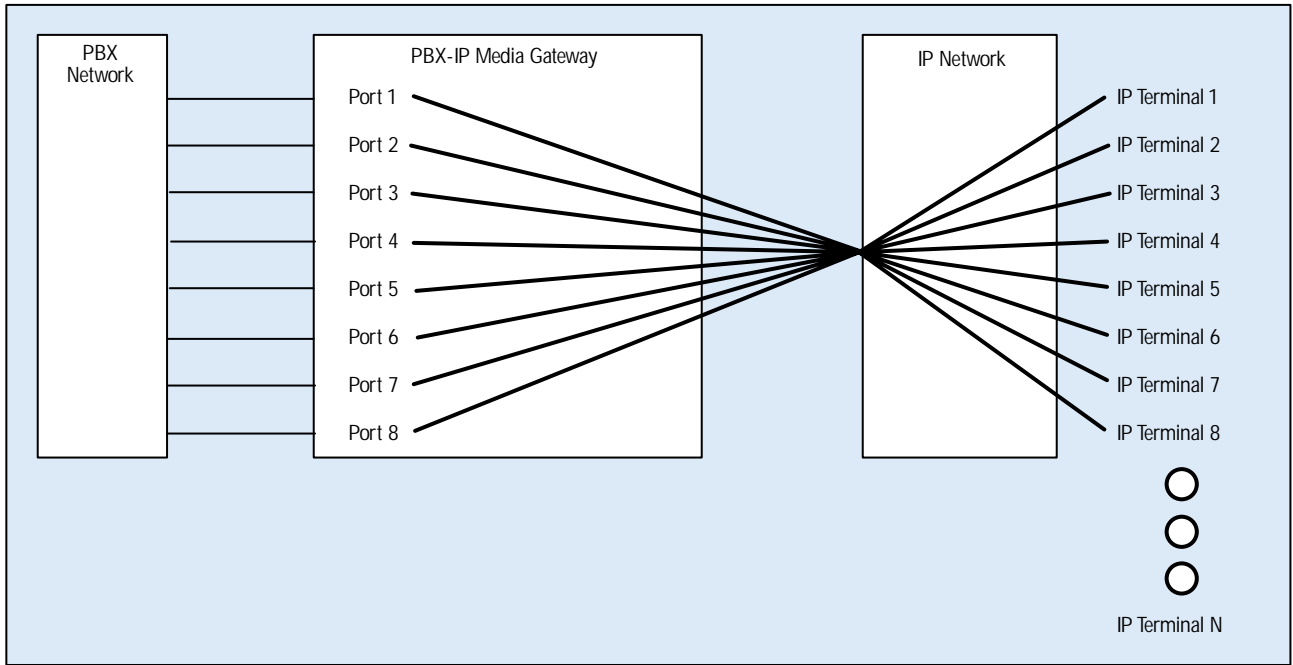


Figure 5: Pooled Routing

### Pooled Routing

In pooled routing, the gateway pools its PBX ports, like a hunt group. IP-to-PBX calls are routed to the first available gateway port in a round-robin fashion. The dialed PBX destination telephone number is transmitted using IP call information. PBX-to-IP calls must go through a two-stage dialing process in order to enter the destination IP alias extension (E.164 number). With pooled routing, any IP terminal can originate and receive calls using the gateway.

Pooled routing requires an H.323 gatekeeper or SIP proxy to translate the E.164 number into the IP address of the destination IP terminal.

### Address Translation

Address translation is used to translate alias names, e-mail addresses, telephone numbers, and dot-com addresses into IP addresses. The gateway supports two modes of address translation: localized and centralized.

### Localized Translation

Localized translation does not require the presence of an H.323 gatekeeper or SIP proxy on the IP network since the address translation occurs locally on the gateway. Each gateway port is directly assigned a corresponding IP address. All destination IP terminal addresses are configured directly on the gateway as IP addresses.

### Centralized Translation

Centralized translation requires an H.323 gatekeeper or SIP proxy to control the address translation. IP terminals that have registered an alias extension (E.164 number) with the H.323 gatekeeper or SIP proxy can receive calls from the gateway, and IP terminals that have registered can originate calls through the gateway. Note that the digital station interface (phone-driving) unit requires centralized translation unless used in conjunction with a corresponding emulating unit.

## Physical Description

### Front of Unit

LEDs on the front panel reflect the status of the unit, Ethernet, and PBX telephony ports.

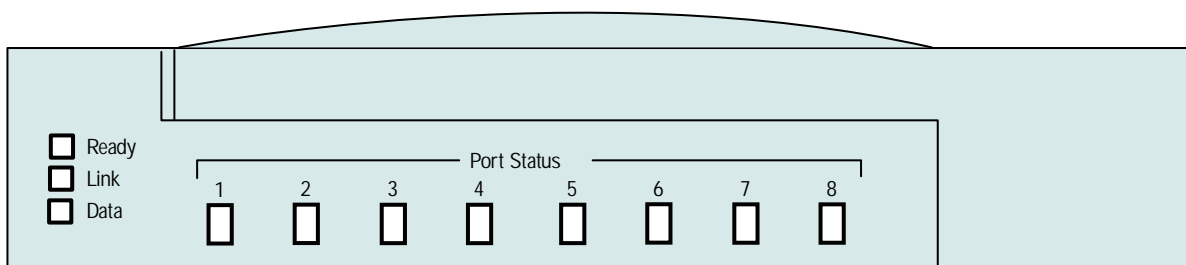


Figure 6: PBX-IP Media Gateway Front Panel

**Ready** – shows the unit's status

- Off – the unit is not powered
- Steady red – the unit is in its power-on initialization stage
- Steady green – power-on initialization is complete, and unit is waiting for application load
- Flashing red – an error occurred during application initialization; unit is inactive
- Flashing green – application initialization is complete; unit is active
- Flashing orange – application is running on unit, but has entered a state in which it cannot function

**Link** – shows the unit's Ethernet status

- Off – an Ethernet link has not been established
- Steady green – an Ethernet link has been established

**Data** – shows the unit's Ethernet RTP activity

- Off – the unit is neither receiving nor transmitting RTP
- Flashing green – one or more calls are active, and the unit is receiving and transmitting RTP

**Port Status 1-8** – shows the unit's PBX link status; the functions of the port status indicators depend on whether the PBX-IP media gateway is an emulator or phone-driving unit

### Emulating Mode

- Steady green - indicates that a carrier is present
- Flashing green - indicates activity on the port
- Steady yellow - hardware carrier is present, but no software communication
- Flashing yellow – external power detected, but cannot gain hardware carrier
- Steady red - indicates that no carrier is present

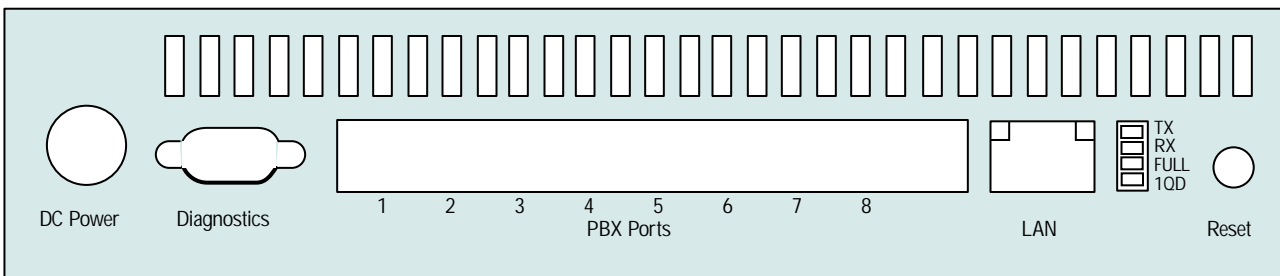
### Driving Mode

- Steady green - indicates that a carrier is present
- Flashing green (fast) - indicates voice activity on the port
- Steady yellow - indicates that no carrier is present
- Flashing red – power fault on port

### Rear of Unit

The back panel contains both interfaces and indicators.

Figure 7: PBX-IP Media Gateway Rear Panel



### Interfaces

- DC power
- Serial port for diagnostics or serial protocol support
- 8 telephony ports
- Ethernet port
- Reset switch

### Status Indicators

- 10/100BaseT
- Full/half duplex
- Rx/Tx traffic
- Ethernet link state
- Ethernet collision

## Technical Specifications

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### PBX Interface:

Number of ports	8 ports per unit. Use multiple gateway units for higher port counts.
Connectors	8 shielded female RJ-45 jacks
Supported PBX models (emulating units)	Nortel Networks Meridian 1 and Norstar Avaya DEFINITY G3, and Merlin Magix and Legend NEC 2400 IMX, 2400 IMG, and NEAX 2000 Siemens Hicom 300 series (North American software only) Mitel SX-200, SX-2000
Digital phone models (phone-driving units)	Nortel Networks M2000 and M7000 series Avaya 6400, 8400, 4400, and MLX series NEC Dterm III and Dterm E series Siemens Optiset E series
Supported serial protocols (emulating units)	SMDI, MCI and MD110

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### Network Interface:

	10/100 BaseT Ethernet LAN port
Connector	1 shielded female RJ-45 jack for LAN

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### VoIP Protocols:

ITU H.323 v3, H.450 supplementary services (including H.450.2/4/7, a call transfer/call hold/message waiting indicator)  
SIP per Draft-IETF-SIP-RFC2543bis-05  
RTP/RTCP for delivery of voice

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### FOIP Protocol:

T.38 FoIP	Emulating units transcode fax from T.30 fax protocol, supporting V.21, V.27, V.29, and V.17 modulation schemes, to T.38 for transmission over a packet network
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### Voice Support:

G.711 m-Law and A-Law, G.723.1, G.729AB  
Silence suppression with comfort noise  
G.168 automatic echo cancellation

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### Quality of Service:

Type of service (ToS)  
IP precedence

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### Configuration and Management:

SNMP v1	Read-only for alarm reporting
DHCP	For IP address configuration
Web GUI	With context-sensitive Help facility
Telnet	
BOOTP client and TFTP client	Built-in

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### Call Routing (emulating units):

Point-to-point  
Pooled  
Supports configuration of a backup SIP proxy server

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### Call Routing (Phone-driving units):

Local and 911 calls can be routed to local trunk gateway or other local server  
Supports configuration of a backup SIP proxy server

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## Technical Specifications (cont.)

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### Power Requirements:

Line Voltage	90 VAC – 264 VAC
Frequency	47 Hz – 63 Hz

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### Physical Dimensions:

Length	10 in. (254 mm)
Width	9.5 in. (241 mm)
Height	2.1 in. (53 mm)
Weight	Approximately 2.5 lbs. (1.13 kg)

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### Environmental:

Operating temperature	32°F to 122°F (0°C to 40°C)
Non-operating temperature	-4°F to 158°F (-20°C to 70°C)

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### Regulatory/Safety/EMI Certifications:

<b>United States</b>	
Emissions	FCC Part 15 Class B
Telco	FCC Part 68
Safety	ANSI/UL 60950, third edition
<b>Canada</b>	
Emissions	IC ES-003 Class B
Telco	IC CS03, Issue 7
Safety	CAN/CSA 60950, third edition
<b>European Union</b>	
Emissions	EN 55022-1998 Class B
Immunity	EN 55024:1998
Safety	EN 60950

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