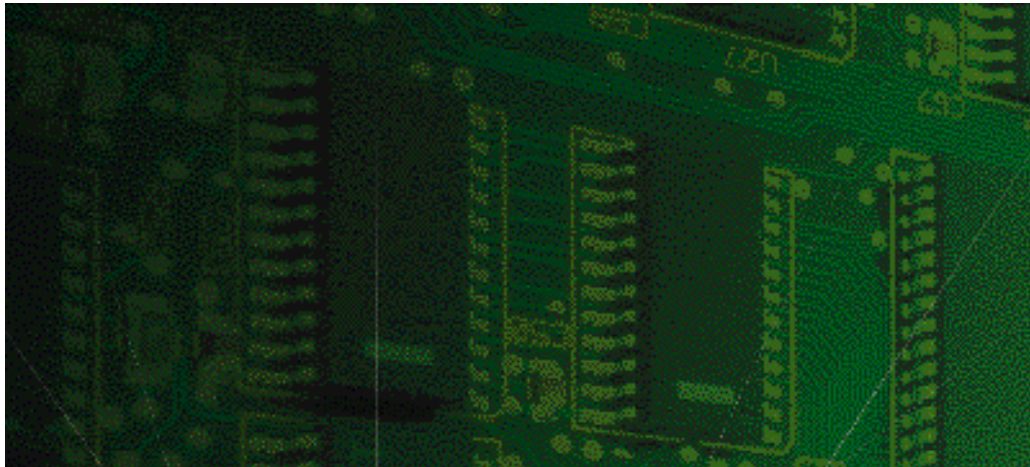




Quad Modem NAC

Getting Started Guide



P/N 1.024.1316-00



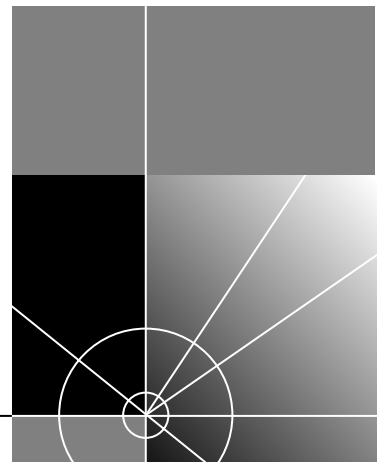


Quad Modem Network Application Card

Getting Started Guide

<http://www.3com.com/>

Part No. 1.024.1316-00
Published February 1998



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5400 Bayfront Plaza
Santa Clara, California
95052-8145

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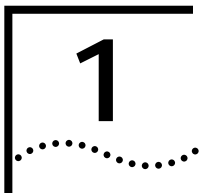
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OVERVIEW





This chapter provides an overview of:

- Document conventions
- Product description
- Product compatibility

Refer to the Total Control Hub Documentation CD-ROM for more information regarding product warranty and contact information.

Document Conventions

The following table lists conventions used throughout this guide.

Icon	Notice Type	Description
	Information note	Information containing important features or instructions.
	Caution	Information alerting you to potential damage to a program, system, or device.
	Warning	Information alerting you to potential personal injury or fatality. May also alert you to potential electrical hazard.
	ESD	Information alerting you to take proper grounding precautions before handling a product.

Product Description

The Quad Modem Network Application Card (NAC) contains four 3Com modems available in digital, analog, and digital/analog versions.

Quad Digital Modem

- Works with channelized T1, T1/PRI, E1/PRI, and E1/CAS NACs to connect a local network and digital trunk.
- Directs data to either a chassis Gateway card or a Modem Network Interface Card (NIC) Electronic Industries Association (EIA) -232 interface.

Quad Analog Modem

- Works with Quad Modem NIC to provide each modem with a Public Switched Telephone Network (PSTN) interface.
- Directs data to either a chassis Gateway card or a Modem NIC EIA-232 interface.

Product Compatibility

The Quad Modem NAC is compatible with the following NIC:

- Quad Modem NIC

2

INSTALLATION

This chapter contains Quad Modem NAC installation information.

Installation Tools

To install this NAC into the Total Control chassis, you will need:

- A #2 Phillips screwdriver
- A flat-head screwdriver

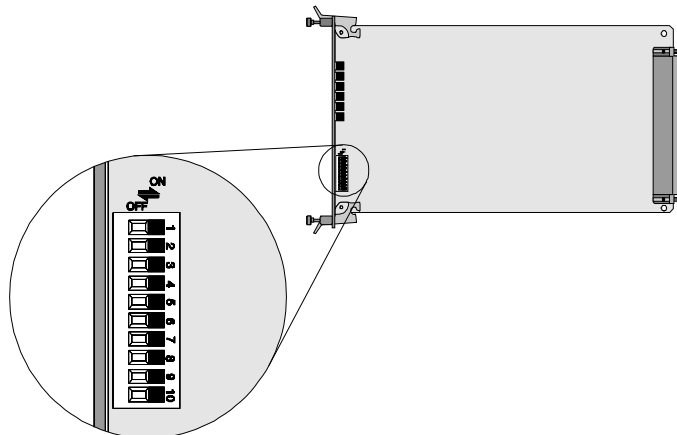
Installation Procedure

To install this NAC:



ESD: To reduce the risk of electrostatic discharge (ESD), take proper grounding precautions before handling the NAC.

- 1 Install the NIC corresponding to this NAC. Refer to the *Quad Modem NIC Getting Started Guide* for more information.
- 2 Set the NAC Dual In-Line Package (DIP) switches using the following table.



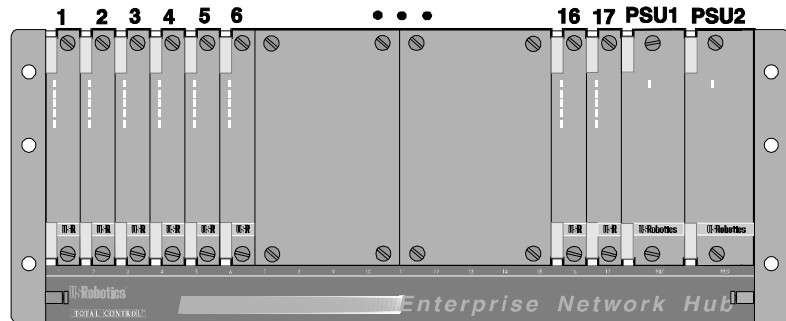
DIP Switch Number	Function
1	Data Terminal Ready (DTR) Operations <ul style="list-style-type: none">■ OFF: Normal DTR operations. Computer must provide DTR signal for modem to accept commands. Dropping DTR terminates a call.■ ON: DTR always ON (override)
2	Verbal/Numeric Result Codes—when DIP Switch 3 is: <ul style="list-style-type: none">■ OFF: Verbal (word) results■ ON: Numeric results
3	Result Code Display <ul style="list-style-type: none">■ OFF: Results suppressed■ ON: Results enabled
4	Command Mode Local Echo <ul style="list-style-type: none">■ OFF: Keyboard commands displayed■ ON: Echo suppressed
5	Auto Answer <ul style="list-style-type: none">■ OFF: Modem answers on first ring■ ON: Auto answer disabled
6	Carrier Detect (CD) Operations <ul style="list-style-type: none">■ OFF: Modem sends CD signal when it connects with another modem and drops CD on disconnect.■ ON: CD always ON (override)
7	Auxiliary—when DIP Switch 3 is: <ul style="list-style-type: none">■ OFF: Result codes in Originate and Answer mode■ ON: Result codes in Answer mode disabled
8	AT Command Set Recognition <ul style="list-style-type: none">■ OFF: Command recognition disabled (Dumb mode)■ ON: Command recognition enabled (Smart mode)
9	Escape Code (+++) Response—when DIP Switch 8 is: <ul style="list-style-type: none">■ OFF: Modem hangs up, returns to Command mode, sends NO CARRIER result■ ON: Modem maintains connection, returns to Command mode, sends OK result
10	Power-on and Reset Defaults <ul style="list-style-type: none">■ OFF: Load from nonvolatile memory (NVRAM)■ ON: Load fail-safe default configuration template from ROM

i The NAC can be installed whether or not power is applied to the chassis.

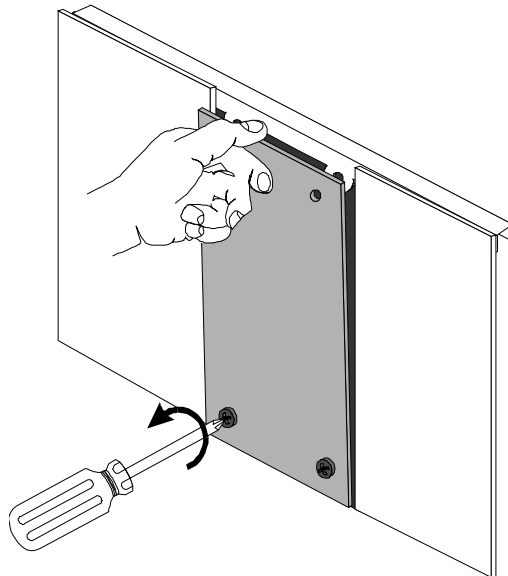
- 3 Select a slot at the front of the Total Control chassis for installing the NAC.

This NAC can be installed in slot(s): 1-17

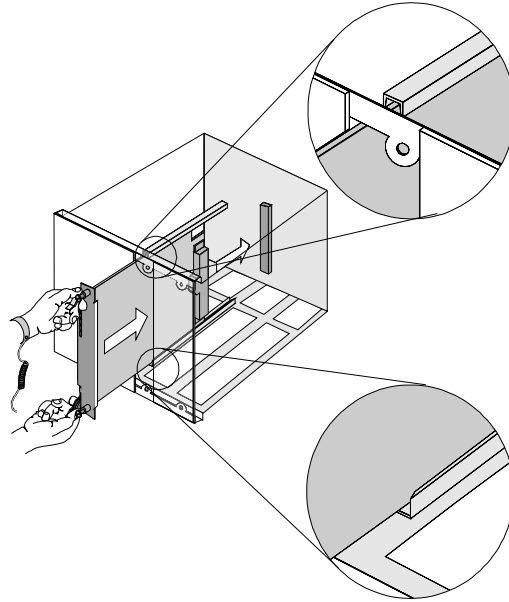
i For a managed chassis, slot 17 is reserved for the Network Management Card (NMC) NAC.



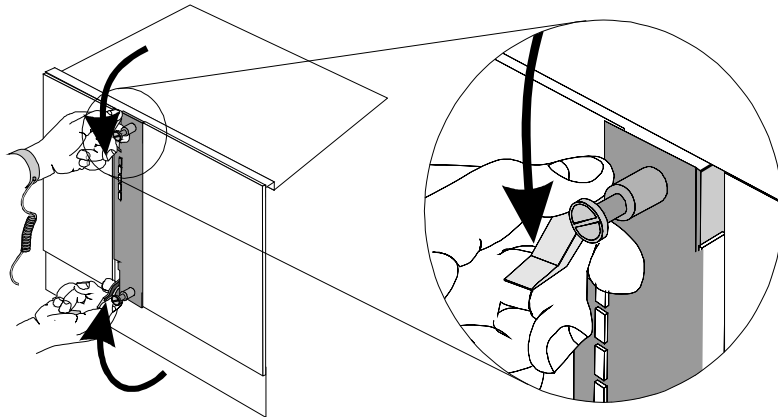
- 4 Remove the safety panel covering this slot.



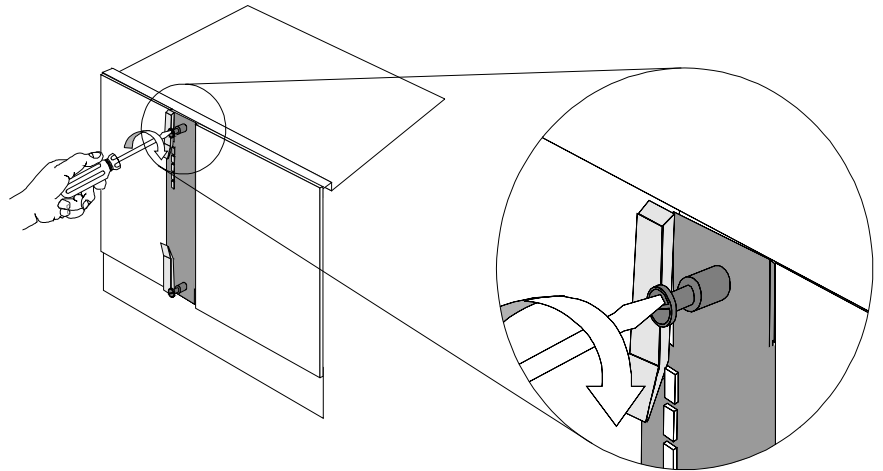
- 5 Insert the NAC between the slot's upper and lower card guides.



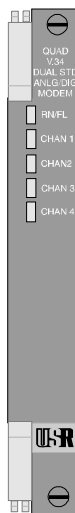
- 6 Holding the tabs perpendicular to the NAC's front panel, slide the NAC into the chassis, until the front of the NAC is flush with the chassis. Push the tabs toward each other to secure the NAC.



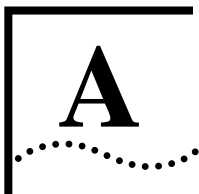
- 7 Tighten the screws on the front panel.



- 8 Cover any unused chassis slots with safety panels.
- 9 Apply power to the chassis, if power is not already applied.
- 10 After the NAC boots verify that the RN/FL (run/fail) LED is green.



- If the RN/FL LED does not light, or is solid red or flashing red, there is an error. Refer to the *Troubleshooting* section for more information.
- If the RN/FL LED is green, continue configuring the Quad Modem. Refer to the *Quad Modem Product Reference* for configuration information.



TROUBLESHOOTING AND TECHNICAL SPECIFICATIONS

Troubleshooting

LED Error If the LED is showing no indicator light:

- Improper installation
 - Check cabling and switch position
 - Remove PSU and reinstall
- Input voltage failure
 - Test voltage source

If the LED is showing solid red:

- Needs a new download
 - Perform SDL
 - Check for reflash indicating new NAC file

If the LED is showing solid red or flashing red:

- Improper installation
 - Check cabling
 - Remove PSU and reinstall
- Input voltage out of spec
 - Test input voltage
- Overload condition
 - Remove NICs and NACs one at a time to determine if one is causing error

Technical Specifications

Certifications FCC Part 68 registered and complies with Part 15, Class A for nationwide telephone systems; UL-listed, CSA-approved, and IC-certified

Mechanical

Component	Length “	Height “
Modem Board	12.45	6.400
EIA RS-232 Network Interface Card (NIC)	4.85	6.400

Environment

Shipping and Storage

Temperature: -25 to 75° C
 Humidity: 0 to 100%, Non-condensing

Operating

Temperature: 0 to 40° C
 Humidity: 0 to 95%, Non-condensing

Channel Capacity

Sixteen Quad Modem cards installed in a Total Control chassis support sixty-four phone line channels.

Compatibility

- ITU-T V.90**
- 56K, 54.6K, 53.3K, 52K, 50.6K, 49.3K, 48K, 46.6K, 45.3K, 44K, 42.6K, 41.3K, 40K, 37.3K, 34.6K, 33.3K, 32K, 30.6K, 29.3K, and 28K, asynchronous, Pulse Coded Modulation (PCM)
 - 33.6K to 4800 bps, asymmetrical, V.34 backchannel

ITU-T V.34	33.6K, 31.2K, 28.8K, 25.4K, 24K, 21.6K, 19.2K, 16.8K, 14.4K, 12K, 9600, 7200, and 4800 bps, synchronous/asynchronous, Trellis Coded Modulation (TCM)
V.Fast Class (V.FC)—Rockwell International	28.8K, 26.4K, 24K, 21.6K, 19.2K, 16.8K, 14.4K bps, synchronous/asynchronous, Trellis Coded Modulation (TCM)
U.S. Robotics x2	<ul style="list-style-type: none"> ■ 57.3K, 56K, 54.6K, 53.3K, 52K, 50.6K, 49.3K, 48K, 46.6K, 45.3K, 44K, 42.6K, 41.3K, 40K, 38.6K, 37.3K, 36K, 34.6K, 33.3K, 32K, 28K, 26.6K, and 25.3K, asynchronous and asymmetrical, Pulse Coded Modulation (PCM) ■ 31.2K to 4800 bps, asymmetrical, V.34 backchannel
U.S. Robotics V.32 <i>terbo</i>	<ul style="list-style-type: none"> ■ 21.6K, 19.2K, 16.8K, 14.4K, 12K, 9600, 7200 bps asynchronous, 19.2K, 16.8K, 14.4K, 12K, 9600, 7200 bps synchronous, Trellis Coded Modulation (TCM) ■ 4800 bps, synchronous/asynchronous, Quadrature Amplitude Modulation (QAM)
U.S. Robotics High Speed Technology (HST—Dual Standards Only)	16.8K, 14.4K, 12K, 9600, 7200 and 4800 bps, asynchronous, asymmetrical, 450 bps back channel with automatic handshake adjustment to 300 bps, Trellis Coded Modulation (TCM), Quadrature Amplitude Modulation (QAM)
ITU-T V.32 <i>bis</i>	<ul style="list-style-type: none"> ■ 14.4K, 12K, 9600, 7200 bps, synchronous/asynchronous, Trellis Coded Modulation (TCM) ■ 4800 bps, synchronous/asynchronous, Quadrature Amplitude Modulation (QAM)
ITU-T V.32	<ul style="list-style-type: none"> ■ 9600 bps, synchronous/asynchronous, Trellis Coded Modulation (TCM) ■ 4800 bps, synchronous/asynchronous, Quadrature Amplitude Modulation (QAM)
Additional Compatibility Features	<ul style="list-style-type: none"> ■ ITU-T V.25, answer sequence ■ Bell 208B, 4800 bps, synchronous, Quadrature Amplitude Modulation (QAM)

- ITU-T V.23, 1200 bps, asynchronous, asymmetrical (1200/75 bps), Frequency Shift Keying (FSK)
- ITU-T V.22 *bis*, 2400 bps, synchronous/asynchronous, Quadrature Amplitude Modulation (QAM)
- ITU-T V.22, 1200 bps, synchronous/asynchronous, Differential Phase Shift Keying (DPSK)
- Bell 212A, 1200 bps, synchronous/asynchronous, Differential Phase Shift Keying (DPSK)
- Bell 103, 300 bps, asynchronous, Frequency Shift Keying (FSK)
- ITU-T V.21, 300 bps, asynchronous, Frequency Shift Keying (FSK)
- U.S. Robotics HST error control protocol for HST modulation
- ITU-T V.42 error control protocol for modulations V.22, V.22 *bis*, Bell 212A, V.32, V.32 *bis*, V.32 *terbo*, V.FC, x2, and V.90
- ITU-T V.42 *bis* data compression for modulations V.22, V.22 *bis*, Bell 212A, V.32, V.32 *bis*, V.32 *terbo*, V.FC, x2, and V.90
- Microcom Networking Protocol (MNP) error control protocol for modulations V.22, V.22 *bis*, Bell 212A, V.32, V.32 *bis*, V.32 *terbo*, V.FC, x2, and V.90
- Microcom Networking Protocol (MNP), Level 5 data compression for modulations V.22, V.22 *bis*, Bell 212A, V.32, V.32 *bis*, V.32 *terbo*, V.FC, x2, and V.90
- Microcom Networking Protocol error control Class 10 (MNP10), at 14.4K/12K/9600/7200/4800 (V.32 *bis* mode) and at 1200 bps
- Microcom Networking Protocol error control Class 10 Enhanced Cellular (MNP10EC), at 14.4K/12K/9600/7200/4800 (V.32 *bis* mode)
- Enhanced Throughput Cellular™ (V.42 ETC) error control protocol, at 14.4K/12K/9600/7200/4800 bps (V.32 *bis* mode) and at 1200 bps
- Pulsed DSR/CTS following CD signal options
- Superset of industry standard AT command set

Operational Modes

- Auto Dial/Auto Answer
- Auto Answer only
- Fax Modems

- Auto Dial/Auto Answer
- Auto Answer only
- Fax mode

Fax Service Class 2.0 Commands

For information on Class 2.0 technical specifications, contact Global Engineering Documents, at 1-800-854-7179. The document that covers this information is:

ANSI/EIA/TIA-592-1993 (EIA-592)
Asynchronous Facsimile DCE Control Standard
May, 1993

Optional Class 2.0 Fax Commands Supported

U.S. Robotics uses these optional Class 2.0 fax commands:

+FNS	Pass-through non-Standard negotiation byte string
+FCR=0,1	Capability to receive
+FAA=0,1	Adaptive Answer mode
+FCT=0-255 sec.	Phase C Timeout
+FHS?	Hangup Status Code, read only
+FMS=0-3	Minimum Phase C Speed
+FBS?=500,100	Buffer size, read only

Fax Service Class 1 Commands

+FCLASS=n (0,1)	Class identification and control
+FTS=n (0,255)	Stop transmission and pause, 10 ms.
+FRS=n (0,255)	Wait for silence, 10 ms.
+FTM=n (3,24,48,72,96)	Transmit data with carrier
+FRM=n (3,24,48,72,96)	Receive data with carrier
+FTH=n (3,24,48,72,96)	Transmit HDLC data with carrier
+FRH=n (3,24,48,72,96)	Receive HDLC data with carrier

V.25 *bis* Synchronous Commands and Result Codes

Dial Options 0-9 & : > < = P T; space . - * #) (!

Result Codes **Call Failure Indication (CFI) with optional parameters:**

- Abort call (CFAB)
- Local modem busy (CFCB)
- Engaged tone (CFET)
- Forbidden call (CFFC)
- Number not stored (CFNS)
- Answer tone not detected (CFNT)
- Ring tone (CFRT)
- Connect (CNX)
- List of numbers (LS)
- List of forbidden numbers (LSF)
- List of stored numbers (LSN)
- Incoming call (INC)

Invalid (INV) with optional parameters:

- Message syntax error (INVMS)
- Command unknown (INVCU)
- Parameter syntax error (INVPS)
- Parameter value error (INVPV)
- Valid (VAL)

**Commands and Result
Codes Not Supported**

- Call request with identification number (CRI)
- Program identifier (PRI)
- Request list of identification numbers (RLI)
- List of delayed call numbers (RLD)

DTE Interface Rates 115.2K, 57.6K, 38.4K, 19.2K, 9600, 4800, 2400, 1200, 300 bps

**Online Fallback/
Fall Forward** For modulations V.32, V.32 *bis*, V.32 *terbo*, V.FC, x2, and V.90

**Communications
Channel**

- T1 and E1/PRI dial-up
- 2-wire dial up
- Demand-driven high speed channel turnaround in HST mode
- Symmetrical speeds in V.32 *bis*, V.32 *terbo*, and V.FC modes
- Asymmetrical and symmetrical speeds in V.34 and V.34 *plus* modes

Dialing

- DTMF tone dialing or pulse dialing
 - DTMF tones = 0-9, #, *
- MF tones over T1
 - MF tones = 0-9, #, *, ST, KP

Data Format Binary, serial, asynchronous; defaults to 7-bit word length, even parity, 1 stop bit

Word Length	Parity	Stop Bits
7	Even, Odd, Mark, Space	1
7	None	2
8	None	1

**Modem Power
Requirements**

- 2.1 A @ +5.2 VDC
- 0.0 A @ +12.2 VDC
- 24.66 watts
- 84.57 BTU/Hr

Modem Test Functions

- Analog Loopback (Quad Analog and Quad Analog/Digital modems only)
- Bilateral Digital Loopback
- Remote Digital Loopback

Testing is individually selectable using software. The system supports simultaneous testing, regardless of test type selected for any one modem.

Automatic Retrain

On poor quality lines when operating at 2400 – 56K bps

Flow Control Buffers

- | | |
|------------------------|--|
| Transmit Buffer | <ul style="list-style-type: none"> ■ Error control
3.25K bytes ■ Non-error control
1.5K bytes, 128-byte option |
| Receive Buffer | 2K bytes |
-

Command Buffer

64 characters, exclusive of AT prefix, carriage return, and spaces

Front Panel LEDs

- RN/FL
Normal/Fail
 - CHAN
Modem Channels 1-4/Testing/Fail/Idle/Off-Hook/Connected (one LED for each modem)
-

Transmitter Carrier Frequencies

Protocol	Originate Mode	Answer Mode
ITU-T V.90	8000 Hz	8000 Hz

Protocol	Originate Mode	Answer Mode
ITU-T V.34	1800 Hz	1800 Hz
	1829 Hz	1829 Hz
	1867 Hz	1867 Hz
	1920 Hz	1920 Hz
	1959 Hz	1959 Hz
	2000 Hz	2000 Hz
V.Fast Class	1800 Hz	1800 Hz
	1875 Hz	1875 Hz
	1920 Hz	1920 Hz
USR-V.32 <i>terbo</i> / V.32 <i>bis</i> / V.32	1800 Hz	1800 Hz
USR-HST, 450 bps back channel	375 Hz	1800 Hz
HSR-HST, 300 bps back channel	350 Hz	1800 Hz
V.32 <i>bis</i>	1800 Hz	1800 Hz
V.23	<i>Mark</i> : 390 Hz	<i>Mark</i> : 1300 Hz
	<i>Space</i> : 450 Hz	<i>Space</i> : 2100 Hz
V.22 <i>bis</i> , V.22, Bell 212A	1200 Hz	2400 Hz
Bell 103	<i>Mark</i> : 1270 Hz	<i>Mark</i> : 2225 Hz
	<i>Space</i> : 1070 Hz	<i>Space</i> : 2025 Hz
V.21	<i>Mark</i> : 980 Hz	<i>Mark</i> : 1650 Hz
	<i>Space</i> : 1180 Hz	<i>Space</i> : 1850 Hz

Receiver Carrier Frequencies

Protocol	Originate Mode	Answer Mode
ITU-T V.90	1920 Hz	1920 Hz
	1959 Hz	1959 Hz
	2000 Hz	2000 Hz
ITU-T V.34	1800 Hz	1800 Hz
	1829 Hz	1829 Hz
	1867 Hz	1867 Hz
	1920 Hz	1920 Hz
	1959 Hz	1959 Hz
	2000 Hz	2000 Hz
V.Fast Class	1800 Hz	1800 Hz

Protocol	Originate Mode	Answer Mode
	1875 Hz	1875 Hz
	1920 Hz	1920 Hz
USR-V.32 <i>terbo</i> / V.32 <i>bis</i> / V.32	1800 Hz	1800 Hz
USR-HST, 450 bps back channel	1800 Hz	375 Hz
USR-HST, 300 bps back channel	1800 Hz	350 Hz
V.32 <i>bis</i>	1800 Hz	1800 Hz
V.23	<i>Mark</i> : 1300 Hz	<i>Mark</i> : 390 Hz
	<i>Space</i> : 2100 Hz	<i>Space</i> : 450 Hz
V.22 <i>bis</i> , V.22, Bell 212A	2400 Hz	1200 Hz
Bell 103	<i>Mark</i> : 2225 Hz	<i>Mark</i> : 1270 Hz
	<i>Space</i> : 2025 Hz	<i>Space</i> : 1070 Hz
V.21	<i>Mark</i> : 1650 Hz	<i>Mark</i> : 980 Hz
	<i>Space</i> : 1850 Hz	<i>Space</i> : 1180 Hz

Receive Sensitivity -44 dBm ± 2 dBm

Transmit Level -9 dBm maximum

**Transmitter
Frequency Tolerance** .01%