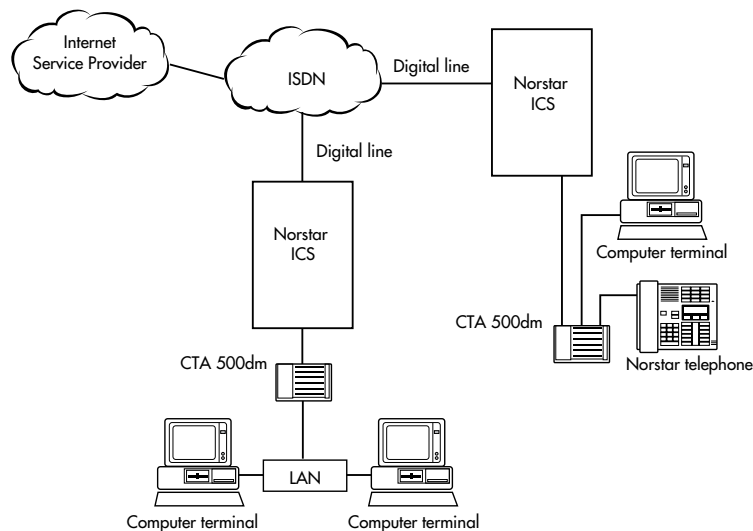


# CTA 500dm

The CTA 500 digital modem (CTA 500dm) is an optional device used with the Norstar Integrated Communication System (ICS). With ICS software, using release 2.0 or higher, the CTA 500dm provides integrated desktop solutions for digital networking applications. With optional Norstar Telephony API Service Provider (TAPI SP), the CTA 500dm also supports Computer Telephony Integration (CTI) services required for today's office environment. With the CTA 500dm you can access remote computers on networks including the Internet. You can also telecommute over a digital telephone network and access the CTA 500dm in your office. The CTA 500dm allows you to access high-speed network features in your office from your home telephone.



## The CTA 500dm in the Digital Network

The CTA 500*dm* serves as a digital modem and terminal adapter (TA). A terminal adapter is a device that allows non-ISDN devices to work with ISDN. It provides reliable high speed end-to-end digital connectivity between your computer and a remote data server using the ICS and the public switched telephone network (PSTN) or Integrated Services Digital Network (ISDN). The CTA 500*dm* supports Point-to-Point Protocol (PPP) and Multilink PPP (MP), which are widely supported by Internet service providers (ISPs) for Internet access and corporate data communication networks (Intranets) for remote LAN access. PPP and MP are supported as built-in features of Windows95.

You can also connect a Norstar telephone to the CTA 500*dm* to access Norstar voice services. You can use the same telephone line to simultaneously carry on a conversation while your computer is connected to the Internet or remote LAN with no loss of ICS features. The CTA 500*dm* connects to the ICS using standard telephone cabling.

MP works with intelligent bandwidth management software in the ICS to provide dynamic bandwidth allocation accessible at your desktop. Norstar station interfaces support two channels that are flexibly allocated to transmit data, voice, or both. When the attached Norstar telephone is not in use, all bandwidth is allocated for data traffic (up to 128 kbit/s). However, if you want to use the phone to answer an incoming call, or place a call using the free line or the intercom, one channel is automatically allocated for the conversation and the data connection continues at 64 kbit/s. When you hang up the telephone, the second channel is automatically reallocated to the data connection.

Using a CTA 500*dm* compliant Norstar TAPI Service Provider, the CTA 500*dm* allows simultaneous PPP/MP data connections and TAPI computer telephony integration (CTI) applications on your PC.

In addition, some of the ICS resources normally used for voice applications, such as network access lines and calling line features, can be used for data traffic. Network access lines can be shared between CTA 500*dm*s and other traffic within the system. Features such as call logging, call restriction, and routing based on time of day can be applied to data traffic for facility utilization and management.

Any PC equipped with Windows95, Internet application software, and a 16550 UART (115.2 kbit/s capability) can use the CTA 500dm.

## Applications

The CTA 500dm can be used for any application that requires dial-up capability and uses **Point-to-Point Protocol**.

These applications include

- Internet access
- remote LAN access
- high-speed modem replacement
- CTI based applications when Norstar TAPI SP is added
- data transmission at up to 64 kbit/s on either channel of an ISDN link or 56 kbit/s on a T1 trunk
- supports **Multilink PPP** to enable the dial-up connections to use two channels

### Internet access

The CTA 500dm allows Norstar customers using digital network interfaces on the Norstar ICS to access Internet service providers (ISPs). You can connect an ISP through the public switched digital network (PSDN) using regular dial-up methods.

### Dial-Up Networking

You can use the CTA 500dm for remote LAN access applications when PPP is used to connect to a remote LAN.

### Data-to-data transfers

The CTA 500dm can be used to establish a connection with an ISDN Terminal Adapter (PPP or MP must be supported) or another CTA 500dm for file transfer. You can connect two computers to the same ICS through their own CTA 500dm units, or connect them through the network. Using the CTA 500dm connection allows analog modems to be replaced with high-speed digital connections. The CTA 500dm does not support connection to analog or 56k modems.

### Computer Telephony Integration (CTI)

With a compliant Norstar TAPI SP, the CTA 500dm allows simultaneous sessions of PPP/MP and CTI based applications to run on PCs.

## CTA 500dm feature summary

- digital networking using PPP/MP
- simplified installation and configuration using installation wizard
- high-speed network rate (56, 64, 112, or 128 kbit/s)
- high-speed serial port support (maximum 115,200 baud)
- integrated desktop solutions (Norstar set, data transfer, and CTI)
- bonding of two 56/64 kbit/s channels using MP
- dynamic bandwidth allocation between voice and data sessions
- data transfer using 3.1 kHz audio call type in ISDN
- support of Password Authentication Protocol (PAP) and with PPP connections, Challenge Handshake Authentication Protocol (CHAP)
- Hayes AT command dialing and configuration
- incoming call screening using calling line identification for security
- in-field software upgrade for feature enhancement
- ICS call management feature support (for example, dialing restrictions, station message detail recording)
- ICS default configuration for simplified installation

## About this document

- The **First-time setup** section has initial installation information.
- The **Installation and setup** section has information on installing the CTA 500dm and configuring your PC and ICS.
- The **Configuration** section has information on configuring the CTA 500dm and Norstar TAPI Service Provider.
- The **Installing Norstar TAPI SP** section has information on setting up Norstar TAPI Service Provider
- The **Resource sharing** section shows how to configure PCs equipped with CTA 500dm to act as Dial-Up Servers.
- The **AT commands** section details the commands used to configure the CTA 500dm.
- The **Troubleshooting** section assists you if you experience problems when using the CTA 500dm.
- The **Appendix** provides important electromagnetic and radio frequency information.

# First-time setup

This section guides you through the initial installation and setup of the CTA 500dm. Installation is carried out from the Personal Productivity Suite CD-ROM. Use the steps listed below to complete the installation.

1. Make the physical connections to the CTA 500dm.

See *Installation and setup*

2. Configure the ICS for the CTA 500dm.

See *Setting up the ICS*

3. Configure the Com port on the PC for the CTA 500dm.

See *Configuring the PC serial port*

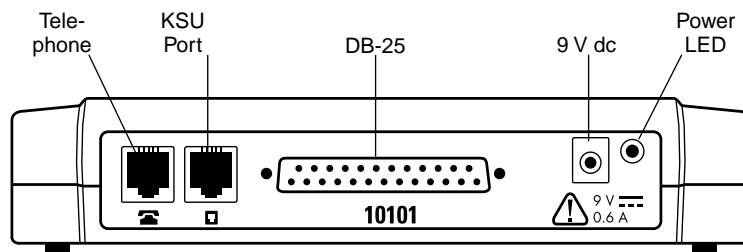
4. Install the CTA 500dm and if required, the Norstar TAPI Service Provider software.

See *Installing CTA 500dm and Norstar TAPI Service Provider software*.



# Installation and setup

You can place the CTA 500*dm* on the desk or mount it on the wall. Refer to [“Wall mounting the CTA 500\*dm\*”](#) on page 8 of this document for the procedure.



The CTA 500*dm* has four jacks that are used to connect a Norstar telephone, an ICS, a computer, and the power supply.

- connect a Meridian Norstar telephone to the Terminal jack (use the telephone cable included with the Norstar set)
- connect the ICS wall plug to the Line jack (use the included 6-way modular socket). Depending on the ICS software release, restrictions may apply on the maximum number of ports and the physical ports to which the CTA 500*dm* can be connected. Refer to the wiring information in *ICS Installation Guide* for more information.
- connect the DB-25 connector to the serial port on the PC (use the included RS-232 cable)
- connect the supplied 9 V dc, 0.6 A power adapter to the dc port (plug the other end of the adapter into a standard three-prong ac outlet)

### **CAUTION!**

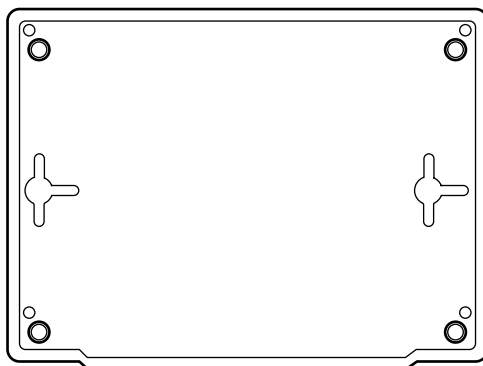
#### **Shock hazard**

For protection from shock hazards, the CTA 500dm must receive power from an Approved Class 2 power pack equipped with a straight plug, center positive connector with a rating of 9 V dc at 0.6 A.

**Note:** The approved power pack must be either CSA or C-UL certified in Canada, and either UL or NRTL listed in the United States.

### **Wall mounting the CTA 500dm**

1. Tape the paper template, supplied with the product, to the wall allowing 12.5 cm (6 in.) clearance for connections to the CTA 500dm.
2. Insert the screws as indicated on the template. Use 4 mm (#8) screws, leaving 6 mm (0.5 in.) of the screw exposed for mounting.
3. Remove the template.



#### **CTA 500dm bottom view**

4. Mount the CTA 500dm onto the screws making sure to orient the connector ports so they are at the top of the CTA 500dm.
5. Route the cables away from the CTA 500dm to avoid potential electromagnetic interference.



## Setting up the ICS

Program the ICS for the CTA 500dm the same way that you program the ICS for a Norstar set. You can program line access, line pool codes and restrictions to apply to outgoing calls. The CTA 500dm must be assigned to a digital line or to a digital line pool. Refer to the “Terminals and sets programming” section of your *Installer Guide* for more information.

The CTA 500dm is a B2 channel device and must be assigned a B2 channel DN. The following table shows the default directory number (DN) that is assigned to the CTA 500dm based on the physical set port that connects the CTA 500dm to the ICS.

Compact ICS		Modular ICS	
ICS Port	Default DN	ICS Port	Default DN
101	80	123	697
102	81	124	698
103	82	125	699
104	83	126	700
105	84	127	701
106	85	128	702
107	86	129	703
108	87	130	704
109	88	131	705
110	89	132	706

You can change the DN that is assigned to the CTA 500dm in the same way that you change a DN for a Norstar telephone. Refer to *ICS Installation Guide* for more information.

**Note:** If you use automatic telephone relocation (set relocation) to change the port used by a CTA 500dm, you must power down the CTA 500dm before changing the connections. If the CTA 500dm is not powered down, programming information will be lost. See *ICS Installer Guide* for more information about set relocation.

## Setting up the PC

Each PC operating system requires a different set up.

**Note:** Installation using another vendor's protocol stack packages will differ. See the **AT commands** section of this document for information on configuring advanced operations on the CTA 500dm from your PC. See the **Appendix** for a list of the DB-25 pins used by the CTA 500dm.

# Configuration

Some operations that you can perform with the CTA 500*dm* include the following:

- Configuring the PC serial port
- Installing CTA 500*dm* and Norstar TAPI Service Provider software

**Note:** Before you begin configuration, connect the ICS and the PC as described in the “Installation and setup” section and power up the CTA 500*dm*.

## Configuring the PC serial port

- Verify the port baud rate is set to 115,200 (default) using the **Serial Interface Rate** command.
- Set the character length, using the **Set Data Bits** command and parity, using the **Set Parity** command. The default is 8 bits with no parity (recommended).
- Set the flow control using the **Flow Control** command. The default is hardware (recommended).

## Installing CTA 500dm and Norstar TAPI Service Provider software

1. From the Norstar Personal Productivity Suite main screen, select the Language, and then the Installation option.
2. After accepting the licensing terms and reading the TAPI requirements (if displayed), select the Install option.
3. Select the CTA 500dm from the right hand side of the dialog box (under the Drivers section).
4. On the left hand side of the dialog box, select the components you wish to install:

Drivers — the required drivers and configuration utility for the CTA 500dm

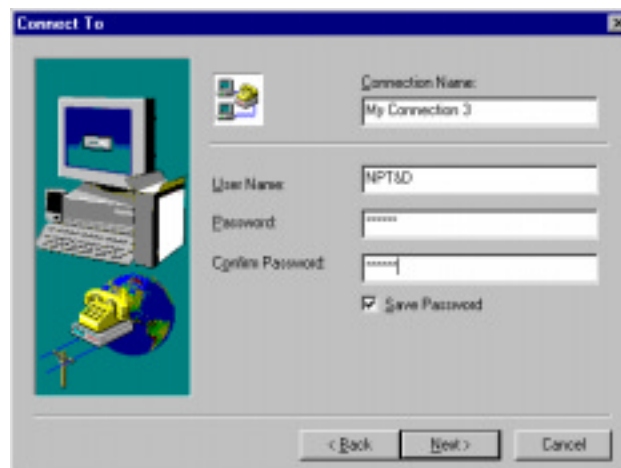
Toolkits — CTE, Norstar TAPI Service Provider (TSP)

Applications

5. Follow the on-screen instructions to select automatic configuration, and to select the proper communications port.
6. Choose the appropriate settings for your installation.

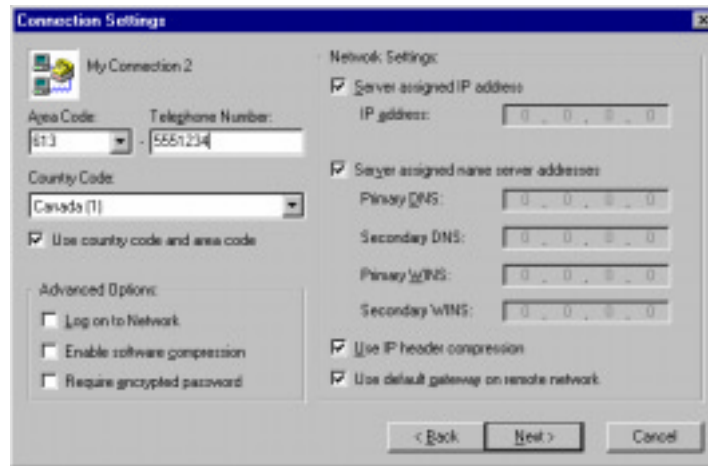


7. Click Next. A message displays the name assigned to the installation. If you need more than one init string for the CTA 500dm, refer to **“Adding multiple CTA 500dm configurations” on page 16** for the procedure.
8. Click OK.
9. Click Yes to automatically setup Internet access through your CTA 500dm.
10. Click Next when you see the message indicating that all network components required are present.
11. Click Yes to automatically setup a connection to your Internet service provider.
12. Select Norstar CTA 500dm.
13. Click Next.
14. Select one of the Internet service providers from the list or click **None of the above**.
15. When the Connect To window displays, enter your user name and password.



16. Click Next.

17. When the Connection Settings dialog box displays, enter the Internet service provider telephone number.



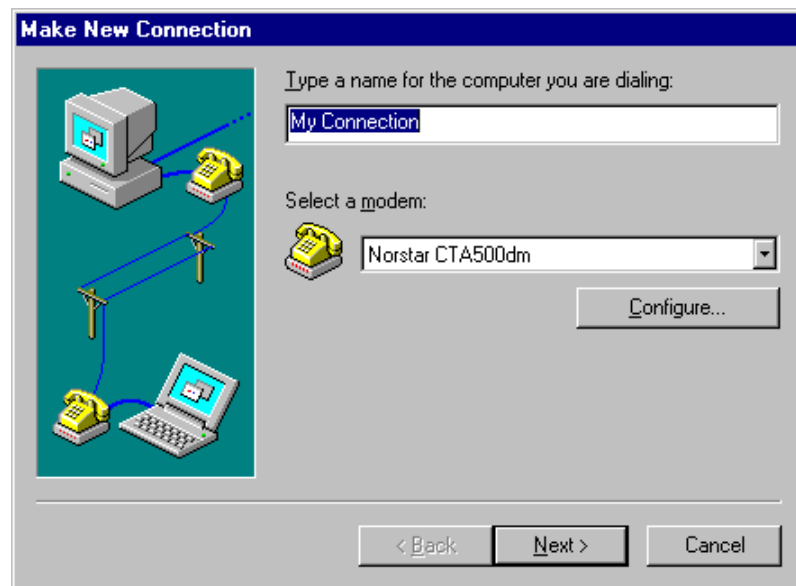
18. Click Next.
19. The installation is complete and you need to restart your computer before using the CTA 500dm.
20. Click the Finish button.

### **Configuring the CTA 500dm (if not configured during installation)**

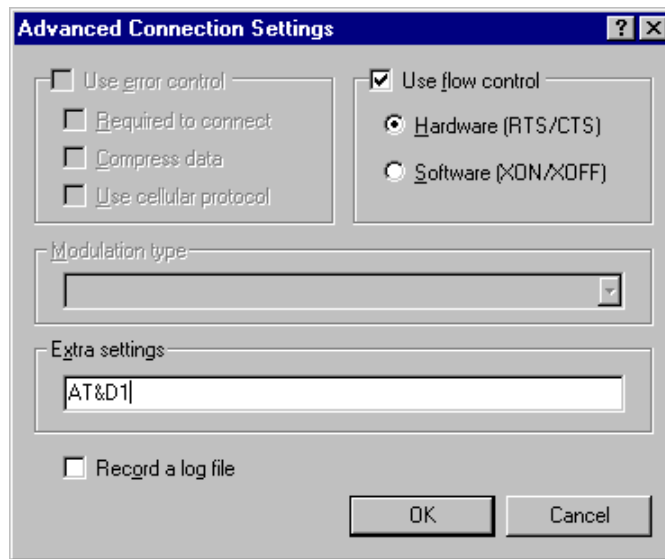
1. From the Windows Start button, navigate to Programs, Norstar CTA 500dm, CTA 500dm Configuration.
2. The CTA 500dm Configuration Options dialog box is displayed.
3. Choose the appropriate settings for your installation.

## Configure CTA 500dm to access PP/MP data calls

1. Double-click on the My Computer icon on your desktop.
2. Double-click Dial-Up Networking icon.
3. Double-click Make New Connection icon.
4. When the Make New Connection window displays, choose Norstar CTA 500dm modem from the pull-down menu.



5. Click the Configure button.
6. Click the Connection tab.
7. Click the Advanced button.
8. In the Advanced Connection Settings window, type AT&D1 in the Extra settings box.



9. Click OK.
10. Close all windows.

### **Adding multiple CTA 500dm configurations**

1. Click the Start button.
2. Choose Programs from the menu.
3. Choose CTA 500dm from the sub-menu.
4. Choose CTA 500dm configurations.
5. Select the Configuration tab.
6. Choose settings for the required configuration.
7. Click OK.

You now have another CTA 500dm configuration with different settings than the first one. Make sure that you note the specific settings when you create the connection icons.



## Upgrading the CTA 500dm software

CTA 500dm software upgrades are periodically made available through your Norstar distributor. Contact your Norstar distributor for details about receiving software upgrades.

Use the CTA 500dm configuration utility to display current settings or to update software.

1. Click the Browse button.
2. When file information displays, click Transmit.
3. Advanced connection settings can be defined using the setup wizard or the **Enter Download State** command.

## Uninstalling the CTA 500dm

1. Open the Control Panel.
2. Open Modems.
3. Select the CTA 500dm configuration that you want to uninstall.
4. Click Remove.

**Note:** You must select another modem for any remaining Dial-Up Networking connections.

If you need to completely uninstall the CTA 500dm, remove all CTA 500dm configurations and delete the CTA 500dm directory and program group.



# Installing Norstar TAPI SP

To use a CTA 500*dm* for TAPI applications, Norstar TSP must be installed. It can be installed at the same time as the CTA 500*dm* software via the Personal Productivity Suite (PPS) installation procedure, or it can be installed later from the PPS CD.

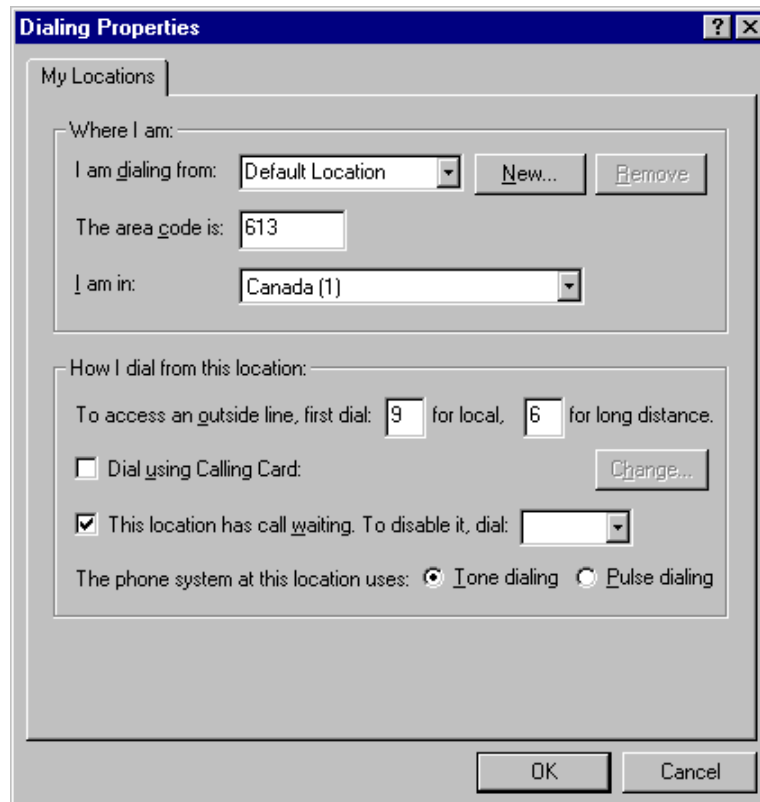
**Note:** The current CTA 500*dm* configuration does not support dynamic bandwidth allocation if you don't have access to a line pool with more than two ISDN lines. When you are making an MP data call and want to make a voice call at the same time, lift the telephone handset in order to make a channel available for the call.

## Configure TAPI dialing properties

If you use an access code to get an external line or get a private network line to make a long distance call (for example, dial 9 before dialing an external number or dial 6 before dialing a long distance number), you need to configure the Norstar set attached to the CTA 500*dm*.

1. Click the Start button and move the cursor to Settings.
2. Choose Control Panel from the sub-menu.
3. When the Control Panel window displays, double-click the Telephony icon.
4. When the Telephony Properties window displays, click the Dialing Properties button.

5. In the Dialing properties window, locate **To access an outside line, first dial:** and enter **x** for local (where x represents the access code) and when applicable, **y** for long distance (where y represents the code to access a private network).



6. Click OK.
7. Close all windows.

## Installing Personal Call Manager

The Personal Call Manager (PCM) application is supplied on the Norstar Personal Productivity Suite (PPS) CD-ROM.

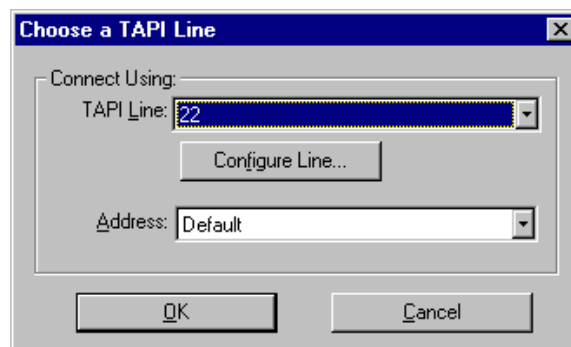
1. From the PPS main screen, select the Language, and then the Installation option.
2. After accepting the licensing terms and reading the TAPI requirements (if displayed), select the Install option.
3. On the left hand side of the dialog box, select Applications and then select PCM from the right hand side of the dialog box.

4. As the installation progresses, choose the appropriate options and click the Next button as required.
5. Once the Setup Complete window displays, click the Finish button. The program is installed and a PCM icon appears on the desktop.
6. To access the program, double-click the PCM icon.

## Using PCM for the first time

When the PCM software is installed, you need to choose a TAPI line to enable PCM to use a TAPI-enabled device. You can change the TAPI line at any time by choosing Dial Using from the Tools menu, which calls up the Choose a TAPI line window.

1. Double-click on the PCM icon on the desktop. The PCM program loads and the Choose A TAPI line window displays on top of the program.



2. Use the pull-down menu to select the line for TAPI connection.
3. In the Address: box choose Default for a typical user configuration or pull down the menu and select your line number to use a specific line for all calls.
4. Click OK.
5. After restarting your PC, Personal Call Manager is ready for use.

**Note:** Whenever you make a change in the Choose a TAPI Line window (connection, address, or both), you must restart your PC for the change to take effect.

**Note:** If your prime line is Intercom, you must have line pool access codes in the Dialing Properties dialog box to make external calls. These line pool access codes will be used for both data and voice calls.

**Note:** Refer to the Nortel ITAS web page for tips and information on other configurations.

# Resource sharing

You can access information, software or peripheral devices (such as printers) that are installed on another PC from your PC when both PCs are equipped with a CTA 500*dm* and Win95 Plus! Dial-Up Server software.

**Note:** Dial-Up Server software is available from either the Microsoft Plus! Pack or ISDN Accelerator Pack.

To share resources, complete the following sections:

- [Installing Dial-Up Server](#)
- [Allowing access to your PC](#)
- [Connecting to a Windows 95 Dial-Up Server](#)
- [Connecting to Resources on the Dial-Up Server](#)

## Installing Dial-Up Server

If you use your PC to dial into other PCs, enable NetBEUI in the Server Types window. If other PCs will be dialling into your PC, enable IP, IPX and NetBEUI.

1. Install Dial-Up Server from either the Plus! Pack or the ISDN Accelerator Pack.
2. Open My Computer.
3. Open Dial-Up Networking.
4. From the Connections menu, select Dial-Up Server.
5. Select Allow caller access.
6. Select Change Password to apply a password to the connection. A password is recommended but is not mandatory when using Dial-Up Server.
7. Information that is entered in the Comment field is displayed to other PCs that attempt to dial in to your PC.
8. Click Apply.

The Status changes to Monitoring. When another PC dials in, the Status changes to Answering. Once a connection is established the guest PC's login name is shown.

## Allowing access to your PC

1. Open My Computer.
2. Open the Control Panel.
3. Open Network.
4. Select the Identification tab.

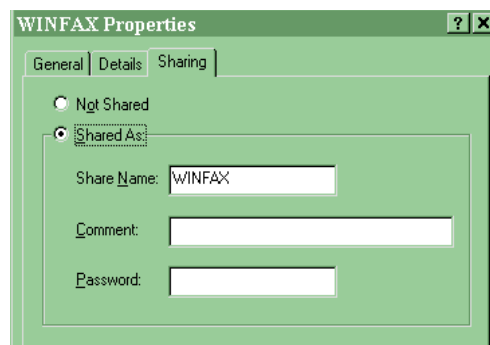




The Computer Name is required by PCs attempting to access your PC.

5. Close the Network window. The Control Panel window is still open.
6. Select one resource that you want to make available to other PCs, (for example, fax machine) and select it.
7. From the File menu select Properties.
8. Click the Sharing tab.
9. Select Shared As.
10. Enter a Share Name, any applicable Comment, and a Password.

The Share Name and Password are required by PCs attempting to access your PC.



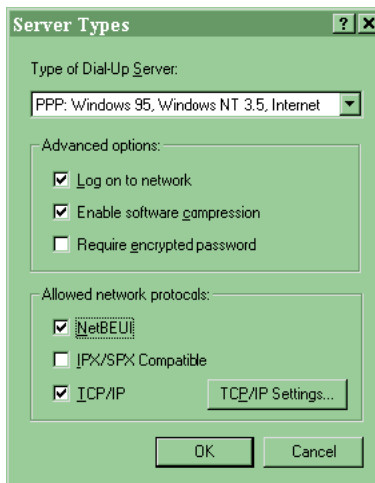
11. Close all open windows.

## Connecting to a Windows 95 Dial-Up Server

1. Double-click the My Computer icon on the desktop.
2. Open Dial-Up Networking.
3. Select the CTA 500dm modem.
4. Use the File pull-down menu to choose Properties.
5. Click the Server Type... button.
6. Add a connection in Dial-Up Networking on the client PC with the phone number of the CTA 500dm as the Dial-Up Server PC.

**Note:** You do not need to bring up a Terminal Window after dialing.

7. Select PPP: Windows95,... as Type of Dial-Up Server.
8. Check the to network box in Advanced options.
9. Check NetBEUI for Allowed Network Protocols.



10. Click OK.
11. Click OK.

In the Dial-Up Networking window, double-click the icon of the modem you want to connect. The name and password are not yet required.

## Connecting to Resources on the Dial-Up Server

### Method one

1. Right-click on Network Neighborhood.
2. Select Find Computer.
3. Enter the name of the computer that you want to browse.
4. Click on the Find Now button.

### Method two

1. Click on the Start button.
2. Move the cursor to Programs.
3. Select Windows Explorer from the sub-menu.
4. From the Tools menu, select Map Network Drive.
5. Enter the Drive letter you want to use. The default letter is the first available Drive. Windows Explorer will display the

resource on the Dial-Up Server under whichever Drive letter you select.

6. Enter the Resource you want to connect to in the Path field.

The syntax is: \\Computer Name\Share Name

**Note:** Windows Explorer displays the new drive letter.

7. Click OK.



# AT commands

Use the following types of AT commands to communicate with your CTA 500*dm*.

- **Profile** commands
- **State** commands
- **General** commands
- **S-registers** commands
- **Call Control** commands
- **TCM Ports Protocol Selection** commands
- **MP** commands
- **Serial Interface** commands
- **Serial Interface Control Lines** commands
- **Calling Line ID** commands
- **Caller ID Security** commands

To use an AT command, establish a HyperTerminal connection from the PC to the CTA 500*dm*. Type the letters *AT* followed by the desired AT command. For instance, the *AT&V0* command queries all stored CTA 500*dm* parameters.

You can string several AT commands into a single entry (for example, *AT &V0 S26 I4*). The individual AT commands within the string do not have to be separated by spaces (*AT&V0S26I4* provides the same information as the separated string in the previous example).

## Profile

A profile defines a CTA 500*dm* set-up. Each profile defines the rate adaptation protocol and the options used with that protocol, the bearer capability and data rate of the next call dialed, the bearer capabilities and acceptable data rates for inbound calls, and the detailed operation of the serial interface port.

The profile does not include stored dial strings.

Three types of profiles are available:

- The factory default which is fixed.
- The user profile which is programmable by the user and is stored in non-volatile memory.
- The active profile which is dynamic while the CTA 500*dm* is in operation. It records changes made using AT commands. When the CTA 500*dm* is powered down, the active profile is lost, unless it is saved as the user profile. On power-up, the active profile is loaded from one of the saved profiles.

The factory profile is profile 0 and the user profile is profile 1.

### Profile commands summary

Command	Description	Value
&Fn	load active profile from factory profile	0 factory profile (default) 1 user profile
Zn	load active profile from stored profile	0 factory profile 1 user profile (default)
&Yn	select profile to load into active profile on power-up	0 factory profile (default) 1 user profile
&W	save active profile to memory	

## Load Stored Profile

The Load Stored Profile Command

Z[value]

or

&F[value]

instructs the CTA 500*dm* to load all values that are stored in a profile. Value 0 indicates that the factory profile should be loaded. Value 1 indicates that the user profile should be loaded.

Any calls in progress are disconnected when you use this command.

The Z command selects the user profile (default value 1). The &F command selects the factory profile (default value 0). Using either command, if no value is specified, the default profile is used.

### Result Codes

**OK** Appears when the command is executed.

**ERROR** Appears when the command could not be executed.

## Load Stored Profile on Start-up

The Load Stored Profile on Start-up Command

&Y[value]

instructs the CTA 500*dm* to load all values that are stored in a profile after a power-up or after a DTR reset if &D is set to 3 (see “[Serial Interface Control Lines](#)” on page 56 for the commands).

Value 0 indicates that the factory profile should be loaded at start-up. Value 1 indicates that the user profile should be loaded at start-up. If no value is specified, the default factory profile is used.

### Result Codes

**OK** Appears when the value is recognized or not supplied.

**ERROR** Appears when the value is invalid or unrecognized.

## Write Active Profile to Memory

The Write Active Profile to Memory Command

&W

instructs the CTA 500dm to save the current configuration to permanent memory. The saved profile becomes the user profile.

### Result Codes

**OK** Appears when the command is executed.

**ERROR** Appears when the command could not be executed.

## State

There are four states in which the CTA 500dm can interface with a computer.

**Command State** No other device is connected, through the network interface, to the CTA 500dm. The CTA 500dm can process and respond to AT commands. When the CTA 500dm cannot establish communication with the connected ICS, it is either in the Commands State or in the Download State.

**On-line Command State** A valid connection exists between the CTA 500dm and another device through the network interface. However, the CTA 500dm can still process and respond to most AT commands.

When the selected rate adaptation protocol has no flow control and the CTA 500dm is in the On-line Command State, data may be lost.

Enter the On-line Command State from the On-line Data State using the Escape Sequence (refer to [“Escape Sequence” on page 35](#)) or using the DTR signal if &D is 1 (refer to [“Serial Interface Control Lines” on page 56](#)).

**Note:** You cannot enter the On-line Command State until the CTA 500dm establishes communication with the connected ICS.

Enter the On-line Data State from this state using the O command ([“Return to On-line Data State” on page 34](#)).



**On-line Data State** A valid connection exists between the CTA 500*dm* and another device through the network interface. The selected rate adaptation protocol operates on data transferred through the interface between the CTA 500*dm* and the attached computer.

You cannot enter the On-line Data State until the CTA 500*dm* establishes communication with the connected ICS.

**Download State** The CTA 500*dm* accepts or waits to accept new programming information from the attached computer while writing the programming information into its Flash EEPROM.

You can enter the Download State on power-up if no valid application software is found, or through the Y command (“**Enter Download State**” on page 34). You can also enter the Download State when the CTA 500*dm* cannot establish communication with the connected ICS.

When the CTA 500*dm* is in the Download State, any set using the pass-through will be connected directly to the ICS through the CTA 500*dm* hardware; it will have to be briefly shut down as the CTA 500*dm* changes from the Download State to the Command State.

## State commands summary

Command	Description	Value
O	return to On-line Data State	
Yxxxx	enter Download State	XXXX=Nor*

## Return to On-line Data State

The Return to On-line Data State Command

○

instructs the CTA 500*dm* to return to the On-line Data State.

Use this command to determine the number of B-channels active for rate adaptation protocols that use more than one B-channel, since the aggregate network rate is returned by the CONNECT indication.

## Result Codes

**CONNECT rate** Appears when the connection is successfully resumed, where rate is the aggregate network rate (56000, 64000, 112000, or 128000).

Immediately after this connection rate is sent, the CTA 500*dm* enters the data mode.

The 112000 and 128000 rates are sent only if both channels on the TCM link are in use.

**NO CARRIER** Appears when the connection could not be reestablished.

## Enter Download State

The Enter Download State Command

Y[password]

instructs the CTA 500*dm* to enter the download state and prepare for the transfer of a file that updates the Flash EPROM. Sets the baud rate at 9600 bit/s. The password is always Nor\*.

After the file transfer has begun, disconnecting the CTA 500*dm* from the attached PC or from the power supply, will put it into the Download State when it is powered back up. This is caused by loss of the Flash EPROM contents.

Immediately after the command is executed, the CTA 500*dm* sends a single line indication SEND PROGRAM FILE USING YMODEM-G (periodically sending G's until the download is started). The CTA 500*dm* then enters the download mode.

After Flash programming is complete, a single line indication of OK is sent.

## Result Codes

**OK** Appears following successful completion of file transfer and Flash programming.

**ERROR** Appears when the programming failed, and the original Flash contents remain unchanged.

## Escape Sequence

The escape sequence

pause, escape character, escape character, escape character, pause

commands a transition from the On-line Data State to the On-line Command State.

The pause before the assertion of the three escape characters is called the guard time. This value is set in S-register 12 and has a default of 1 second. The escape character is set in S-register 2 and has a default of 43 (the ASCII + character).

## Result Code

**OK** Appears when the CTA 500*dm* has entered the On-line Command State.

# General

## General commands summary

Command	Description	Value
In	request identification	0 product ID (default) 1 boot software revision 2 download software version 3 unique identifier 4 capability string 6 CTI MUX mode query 9 PnP identification string
&Vn	view stored parameters	0 all profiles (default) 1 stored dial strings 4 stored Caller ID Security list

Command	Description	Value
En	set echo command	0 turn echo off 1 turn echo on (default)
&Zn=	save dial string	locations 0-9 (default 0)
&Zn?	display saved dial string	locations 0-9 (default 0)
Vn	verbose control	0 numeric indications 1 full indications (default)
Qn	result code control	0 result codes are sent (default) 1 result codes are suppressed
Xn	call monitoring result code selection	0 connect only 1 connect rate only 2 connect rate only 3 connect rate and busy 4 connect rate and busy (default)

## Request Identification

The Request Identification Command

[value]

instructs the CTA 500*dm* to return information about itself to the attached computer.

The returned strings depend on the value passed in the command. See the possible values in the following table. If no value is specified, the default value of 0 is used.

Value	Returned strings
0	product ID (CTA 500 <i>dm</i> )
1	boot software version number
2	download software version number
3	unique CTA 500 <i>dm</i> identity string
4	capability string
6	CTI MUX mode query
9	Plug and Play ID character string

## Result Codes

**OK** Appears following display of the requested information; when the command is successful.

**ERROR** Appears when the chosen value is invalid.

## View Parameters

The View Parameters Command

&V[value]

instructs the CTA 500*dm* to return stored values.

The returned strings vary according to the value included in the command. (See the possible values in the following table.) If no value is specified, the default value of 0 is used.

Parameters are displayed in alphabetical order using a maximum width of 72 columns.

Value	Returned strings
0	all stored profiles
1	all stored dial strings
4	all stored Caller ID Security numbers

### Result Codes

**OK** Appears following display of the requested parameters.

**ERROR** Appears when the chosen value was invalid.

## Set Local Echo

The Set Local Echo Command

E[value]

instructs the CTA 500*dm* to turn the local AT command echo on or off. A value of 0 turns the echo off and a value of 1 turns the echo on. No value defaults to a value of 1.

### Result Codes

**OK** Appears when the command was successful.

**ERROR** Appears when the chosen value was invalid.

## Save Dial String

The Save Dial String Command

&Z[value=]dial string

stores dial strings. The value indicates the location of the dial string (0-9). If no location is specified, the default location (0) is used.

The maximum length of the dial string is 20 characters. There can be a maximum of 10 stored dial strings. Saved dial strings are not part of profiles.

### Result Codes

**OK** Appears when the command was successfully completed.

**ERROR** Appears when the command could not be completed.

## Display Saved Dial String

The display Saved Dial String Command

&Z[value]?

returns the string stored in the specified location.

The OK indication is returned on a new line following the successful completion of the command. If no location is specified, a blank line is followed by the OK indication, and the dial string in location 0 is returned.

### Result Codes

**OK** Appears following successful display of the stored dial string.

**ERROR** Appears when the location number was incorrectly specified.

## Verbose Control

The Verbose Control Command

V[value]

controls the indications sent by the CTA 500*dm*. A value of 0 instructs the CTA 500*dm* to send only numeric indications. A value of 1 instructs the CTA 500*dm* to send full indications. The default value is 1.

The numeric responses and indications are shown in “**Numeric CTA 500*dm* responses**” on page 83.

### Result Codes

**OK** Appears when the value is supported.

**ERROR** Appears when the selected value is unrecognized or is not supported.

## Result Code Suppression Control

The Result Code Suppression Control Command

Q[value]

controls the transmission of result codes by the CTA 500*dm*. Possible values are shown below.

Value	Use
0	result codes sent (default)
1	result codes not sent

### Result Codes

**OK** Appears when the value is 0.

**ERROR** Appears when the value is unrecognized and the previous value was 0.

**none** Appears when the value is 1 and result codes are suppressed.

**none** Appears when the value is unrecognized and the previous value was 1.



## Call Monitoring Result Code Selection

The Call Monitoring Result Code Selection Command

X[value]

controls the format of result codes sent by the CTA 500dm in verbose mode during call setup. (See possible values in the following table.) Values 1 and 2 are identical since the CTA 500dm does not support dial tone detection.

Value	Result Code Operation
0	connect result code, no busy detection
1	connect rate result code, no busy detection
2	connect rate result code, no busy detection
3	connect rate result code, busy detection
4	connect rate result code, busy detection (default)

### Result Codes

**OK** Appears when the value is acceptable.

**ERROR** Appears when the value is unacceptable.

## S-registers

The S-registers allow you to control CTA 500dm operation. The registers are usually both read and write accessible. The registers used vary with the application supported by the CTA 500dm. All S-registers are saved as part of a CTA 500dm profile. S-registers can appear as a group by using the &V command (see [“General” on page 35](#) for more information).

### S-register commands summary

Command	Description	Value
Sn=	set value to S-register	depends on register
Sn?	query S-register value	

## Set S-Register

The Set S-Register Command

Sregister number=[value]

instructs the CTA 500*dm* to set the specified S-register to a value. The register number must be specified. An unspecified value causes the register to have a default setting and an initial factory value.

### Result Codes

**OK** Appears when the command is successfully completed.

**ERROR** Appears when the chosen register or the value for the register is invalid.

## Query S-Register

The Query S-Register Command

Sregister number?

instructs the CTA 500*dm* to return the value of the selected S-register.

### Result Codes

**OK** Appears on a new line following display of the S-register value.

**ERROR** Appears when the chosen register is invalid.

## S-register set

The following table shows the complete S-register set for the CTA 500*dm*. Not all options are supported for all versions of the CTA 500*dm*.

Register	Description	Value
S0	number of rings until answer	0-255 (default 1)
S1	ring count (read only)	0-255 (default 0)
S2	escape character	0-127 (default 43) 128-255 (disables escape sequence)
S3	carriage return character	0-127 (default 13)
S4	line feed character	0-127 (default 10)
S5	back space character	0-127 (default 8)
S7	wait for connection	1-255 in seconds (default 30)
S10	DCD drop time	1-255 in tenths of a second (default 14)
S12	guard time	0-255 in fiftieths of a second (default 50)
S25	DTR detect time	0-255 in hundredths of a second (default 5)
S26	RTS to CTS time	0-255 in hundredths of a second (default 1)

## Call Control

Call Control Commands are associated with making calls through the CTA 500*dm*. They are also understood by most computer software.

### Call Control commands summary

Command	Description	Value
Dx	originate a call	valid dial string or strings
A	answer a call	
H	disconnect from current call	

### Dial Command

The Dial Command

D[dial string][;]

instructs the CTA 500*dm* to originate a call.

The dial string consists of characters, up to the end of the line or to the optional ; character. The dial string stored in location 0 is used if no characters follow the D command; an error is returned when there is no stored dial string.

Character	Use
0-9	dialed digits
p or P	ignored (or may be used to force dial a speech bearer service call)
t or T	ignored (or may be used to force dial a 3.1 kHz audio bearer service call)
, or -	ignored, used as separators or for formatting
!	hook flash
w or W	wait (the CTA 500 <i>dm</i> does not perform dial tone detection, so it will wait for 2 seconds)
,	pause in dialing
&	dial string separator; used for applications that need multiple numbers to dial

Character	Use
Svalue	dial string is taken from a stored telephone number (value is the location of the stored number; see the <b>“General”</b> commands section for more information)

The type of dialing depends on the type of network chosen to route the call, so the directives t (tone) and p (pulse) have no meaning and are ignored.

The ; command line terminator prompts the CTA 500*dm* to dial the string, attempt to make the connection, and immediately change to the On-line Command State (rather than the On-line Data State) upon connection.

Using S value allows linking of the stored dial strings. For example, if S0 has the string 9-1-800-, S1 has the string 123-4567 and S2 has the string 123-5678, then issuing the command ATDS0S1&S0S2 is the same as the command ATD9-1-800-123-4567 & 9-1-800-123-5678.

Press any key before the call is completed to abort the Dial Command.

## Result Codes

**OK** Appears when the command is aborted by the assertion of DTR and if &D is either 1, 2 or 3 (see the **“Serial Interface Control Lines”** on page 56 for the commands).

**CONNECT rate** When the call is successfully completed, the connect indication displays along with the rate of the connection to the network (not the rate of the connection between the CTA 500*dm* and the attached computer) as either 56,000 or 64,000 bit/s.

Immediately after this indication displays, the device enters data mode. DCD is asserted if &C is 1 (see **“Serial Interface Control Lines”** on page 56 for more details).

**Note:** Data protocols that require the use of both B-channels of the TCM have only a CONNECT 112000 or CONNECT 128,000 message (not both), since both calls will not be completed simultaneously.

**NO CARRIER** Appears when connection was not established due to an error or an abort.

**BUSY** Appears when the connection was not completed due to detection of a busy indication in the network.

**ERROR** Appears when the command was issued while in the On-line Command State, if a stored dial string was specified and the dial string was empty, or if the CTA 500*dm* is out-of-sync and the network is unavailable.

## Answer Command

The Answer Command

A

instructs the CTA 500*dm* to answer an incoming call immediately. Successful completion of this command does not necessarily indicate the establishment of a rate adaptation call using both B-channels, but it refers to the establishment of the channel.

Any additional characters on the command line are ignored.

The Answer Command can be aborted by the reception of a single character if the character is received before the command is complete.

## Result Codes

**CONNECT rate** When the call is answered, the connect indication displays along with the rate of the connection to the network (not the rate of the connection between the CTA 500*dm* and the attached computer) either 56,000 or 64,000 bit/s.

Immediately after this indication displays, the device enters the data mode.

**OK** Appears when the command is aborted by the assertion of DTR and if &D is either 1, 2 or 3 (see “[Serial Interface Control Lines](#)” on [page 56](#) for more details).

**ERROR** Appears when the command is issued while in the On-line Command State, if there is no incoming call, or if the CTA 500*dm* is out-of-sync with the ICS.

**NO CARRIER** Appears when connection is not established due to an error or an abort.

## Hook Command

The Hook Command

H

instructs the CTA 500*dm* to disconnect from the current call.

### Result Code

**OK** Appears upon completion of the command. DCD is dropped immediately before the indication if &C is 1 (see “[Serial Interface Control Lines](#)” on page 56 for more details).

## Outgoing Call Control

Calls processed by the CTA 500*dm* can use any of three ISDN bearer services. Additionally, the data rate over each of these bearer services can be set to either 56 kbit/s or 64 kbit/s. See “[Bearer Capabilities](#)” on page 81 for more information.

### Outgoing Call Control commands summary

Command	Description	Value
%A98=n	set outgoing call type	0 data bearer service (default) 1 3.1 kHz audio bearer service 2 speech bearer service
%A4=n	select speed of TCM channels, outgoing calls	0 64 kbit/s 1 56 kbit/s (default)

### Outgoing Call Bearer Service Control

The Outgoing Call Bearer Service Control Command

%A98=value

controls the type of bearer service used by the CTA 500*dm* for making outgoing calls. Not all bearer services are available to all users; however, all bearer services are usually available on an ICS that has an ISDN connection to the network.

The following table shows the values for bearer service selection.

Value	Bearer Service
0	data (default)
1	3.1 kHz audio
2	speech

### Result Codes

**OK** Appears when the selected value is supported.

**ERROR** Appears when the selected value is unrecognized or is not supported.

### Channel Speed Control

The Channel Speed Control Command

%A4=value

instructs the CTA 500*dm* to use the specified data rate for outgoing calls dialed over the B-channels of the TCM port of the CTA 500*dm*. The selected rate applies to both channels on the TCM link.

The following table shows the values for data rate selection.

Value	Data rate
0	64 kbit/s
1	56 kbit/s (default)

### Result Codes

**OK** Appears when the selected value is supported.

**ERROR** Appears when the selected value is unrecognized or is not supported.

## Incoming Call Control

Data calls can be answered over any of the ISDN bearer services. The data rate can be either 56 kbit/s or 64 kbit/s. However, the data rate over either of the voice bearer services must be set to the same rate as the receiving end, since this cannot be indicated in call set-up



messages. See “[Bearer Capabilities](#)” on page 81 for more information.

**Note:** At least one of the bearer rates must be enabled so that the CTA 500*dm* can accept incoming calls.

## Incoming Call Control commands summary

Command	Description	Value
%A93= <i>n</i>	set speech bearer call answer	0 disabled (default) 1 enabled
%A94= <i>n</i>	set 3.1 kHz audio bearer call answer	0 disabled (default) 1 enabled
%A95= <i>n</i>	set data bearer call answer	0 disabled (default) 1 enabled
%A5= <i>n</i>	select speed of TCM channels, incoming voice bearer service calls	0 64 kbit/s 1 56 kbit/s (default)

## Incoming Voice Bearer Call Rate

The Incoming Voice Bearer Call Rate Command

%A5=*value*

instructs the CTA 500*dm* to use the specified data rate for calls received over the B-channels of the TCM port of the CTA 500*dm*. The selected rate applies to both channels on the TCM link.

The following table shows the values for data rate selection.

Value	Data rate
0	64 kbit/s
1	56 kbit/s (default)

## Result Codes

**OK** Appears when the selected value is supported.

**ERROR** Appears when the selected value is unrecognized or is not supported.

## Speech Bearer Call Answer Control

The Speech Bearer Call Answer Control Command

`%A93=value`

allows the CTA 500*dm* to accept or reject incoming calls received over the speech bearer service.

The following table shows the values for speech bearer service calls control.

Value	Speech Bearer Service Calls
0	rejected (default)
1	accepted

### Result Codes

**OK** Sent if the selected value is understood.

**ERROR** Sent if the selected value is not recognized or is not supported.

## Audio Bearer Call Answer Control

The Audio Bearer Call Answer Control Command

`%A94=value`

allows the CTA 500*dm* to accept or reject incoming calls received over the 3.1 kHz audio bearer service.

The following table shows the values for 3.1 kHz audio bearer service calls control.

Value	3.1 kHz Audio Bearer Service Calls
0	rejected (default)
1	accepted

### Result Codes

**OK** Appears when the selected value is understood.

**ERROR** Appears when the selected value is not recognized or is not supported.

## Data Bearer Call Answer Control

The Data Bearer Call Answer Control Command

`%A95=value`

allows the CTA 500*dm* to accept or reject incoming calls received over the data bearer service.

The following table shows the values for data bearer service calls control.

Value	Data Bearer Service Calls
0	rejected (default)
1	accepted

### Result Codes

**OK** Appears when the selected value is understood.

**ERROR** Appears when the selected value is not recognized or is not supported.

### Ringing Indications

When the CTA 500*dm* detects an incoming call that it is allowed to accept, the RI pin is asserted (see [“Serial Interface Control Lines” on page 56](#) for more information), and a text string is provided to the serial interface. The text string is repeated every 6 seconds until the call is answered (manually or automatically), disconnected by the caller, or if the CTA 500*dm* is reset (such as assertion of DTR if &D is 2 or 3).

### Result Code

**RING** Appears when an incoming call is received.

## TCM Ports Protocol Selection

The TCM Port Protocol Selection Command controls use of the TCM port of the CTA 500*dm*. Stored values are part of the CTA 500*dm* profiles.

### TCM Port Protocol Selection Command

Command	Description	Value
%A2=n	select rate adaptation protocol	95 PPP async-to-sync conversion 96 MP

### Rate Adaptation Protocol Selection

The Rate Adaptation Protocol Selection Command

%A2=value

instructs the CTA 500*dm* to use the specified protocol for data transmission using the TCM port of the CTA 500*dm*.

Character	Use
95	PPP async-to-sync conversion
96	MP

### Result Codes

**OK** Appears when the selected protocol is supported.

**ERROR** Appears when the selected value is not recognized or is not supported.

## MP

The following command is available for CTA 500*dm* versions that support MP.

### MP command summary

Command	Description	Value
@BO=n	set number of links in MP bundle	1 single channel used 2 both channels used (default)

### Rate Multiplier

The Rate Multiplier Command

@BO=value

controls the number of links used when the CTA 500*dm* is operating in the MP mode.

A value of 1 indicates that a single link may be used. A value of 2 indicates that two links may be used. The default value is 2.

### Result Codes

**OK** Appears when the value is supported.

**ERROR** Appears when the selected value is not recognized or is not supported.

### CTI MUX Mode

The CTI MUX mode command

ATCTI

activates the ACCESS multiplexer functionality on the CTA 500*dm*. Automatically issued when ACCESS/TAPI is being installed on the PC using the CTA 500*dm*.

## Serial Interface

This section describes the commands associated with the serial interface. All values are saved as part of the CTA 500*dm* profile.

### Serial Interface commands summary

Command	Description	Value
&P2=n	serial interface rate	0 autobauding 1,200 2,400 4,800 9,600 19,200 38,400 57,600 115,200 (default)
&P3=n	serial interface parity	0 none (default) 1 odd 2 even
&P4=n	serial interface data bits per character	7-8 (8 is default)
&P6=n	serial interface stop bits per character	0 one stop bit (default) 1 one and one-half stop bits 2 two stop bits

### Serial Interface Rate

The Serial Interface Rate Command

&P2=value

sets the rate of the interface between the CTA 500*dm* and the attached computer. The permitted values are 0, 1,200, 2,400, 4,800, 9600, 19,200, 38,400, 57,600 and 115,200 (default) for asynchronous operation. CTA 500*dm* uses autobauding when the Value is 0, while the remaining values refer to the rate of transmission.

## Result Codes

**OK** Appears when the value is supported.

**ERROR** Appears when the selected value is not recognized or is not supported.

## Set Parity

The Set Parity Command

&P3=value

sets the parity value of the interface between the CTA 500*dm* and the attached computer. The following table shows the supported values.

Value	Use
0	none (default)
1	odd
2	even

## Result Codes

**OK** Appears when the value is supported.

**ERROR** Appears when the selected value is not recognized or is not supported. Set Data Bits

## Set Data Bits

&P4=value

The Set Data Bits Command sets the number of data bits on the interface between the CTA 500*dm* and the attached computer. The values 7 and 8 are permitted. The default value is 8 data bits.

## Result Codes

**OK** Appears when the value is supported.

**ERROR** Appears the selected value is not recognized or is not supported.

## Set Stop Bits

The Set Stop Bits Command

&P6=value

sets the number of stop bits on the interface between the CTA 500*dm* and the attached computer. The following table shows the supported values.

Value	Use
0	one stop bit (default)
1	one and one-half stop bits
2	two stop bits

### Result Codes

**OK** Appears when the value is supported.

**ERROR** Appears when the selected value is not recognized or is not supported.

## Serial Interface Control Lines

Change the operation of the control lines on the serial interface by using AT commands.



## Serial Interface Control Lines commands summary

Command	Description	Value
\Qn	serial interface flow control	0 none 1 bidirectional XON/XOFF 2 not supported 3 bidirectional RTS/CTS (default) 4 not supported
&Cn	DCD operation	0 always on 1 tracks connection (default) 2 always on, except temporarily after disconnect
&Dn	DTR operation	0 ignored (default) 1 enter command state 2 hang-up and disable auto while DTR is down 3 hang-up and reset port
&Rn	CTS operation	0 CTS follows RTS 1 CTS is always on when on-line (default)
&Sn	DSR operation	0 DSR is always on (default)

## Flow Control

The Flow Control Command

\Qvalue

sets the method of flow control on the interface between the CTA 500dm and the attached computer. The following table shows the allowable values.

Value	Use
0	disable flow control
1	enable bidirectional XON/XOFF software flow control
2	not supported
3	enable bidirectional RTS/CTS hardware flow control (default)

Value	Use
4	not supported

*Note:* XON/XOFF flow control uses characters often referred to as control-Q and control-S.

### Result Codes

**OK** Appears when the value is supported.

**ERROR** Appears when the selected value is not recognized or is not supported.

## DCD Operation

&Cvalue

The DCD Operation Command sets the operation of the DCD pin. The following table shows the allowable values.

Value	Use
0	always on
1	tracks connection (default)
2	always on except temporarily after a disconnect

The DCD pin tracks the connection and asserts when the CTA 500dm has successfully completed a physical layer connection over one of the network B-channels. It does not indicate the successful negotiation of a rate adaptation protocol.

When the value 2 is selected and a connection has been broken, DCD is turned off for the time selected in S-register S10.

All modes of operation may not apply with all selections of rate adaptation protocols.

## Result Codes

**OK** Appears when the value is supported.

**ERROR** Appears when the selected value is not recognized or is not supported.

## DTR Operation

The DTR Operation Command

&Dvalue

sets the operation of the DTR pin. The following table shows the allowable values.

Value	Use
0	ignored by CTA 500dm (default)
1	enter the Command State (normally On-line Command State from On-line Data State)

Value	Use
2	close all connections, change to the Command State (Auto answer is disabled while the DTR is down)
3	as above, followed by a reset of the CTA 500dm

All modes of operation may not apply with all selections of rate adaptation protocols.

When &D is set to 3, assertion of the DTR signal causes a software reset of the CTA 500dm, even if it is already in the command state.

If the CTA 500dm detects that it has been enumerated by a Windows95 Plug and Play software driver, the &D3 reset takes place only when the CTA 500dm is in one of the on-line states. Otherwise, the assertion of DTR indicates the possible request for the Windows95 Plug and Play identification string.

### Result Codes

**OK** Appears when the value is supported.

**ERROR** Appears when the selected value is not recognized or is not supported.

### CTS Operation

The CTS Operation Command

&Rvalue

sets the operation of the CTS pin. The following table shows the allowable values. These values are overridden by the flow control selection if hardware flow control (RTS/CTS) is selected.

Value	Use
0	CTS follows RTS
1	CTS is always on when on-line (default)

### Result Codes

**OK** Appears when the value is supported.

**ERROR** Appears when the selected value is not recognized or is not supported.

## DSR Operation

The DSR Operation Command

&Svalue

sets the operation of the DSR pin. The following table shows the allowable values.

Value	Use
0	DSR is always on (default)
1	DSR is on after protocol is installed (not supported)

The DSR signal is turned on at start-up to be compatible with Windows95 Plug and Play requirements. This corresponds to a &S setting of 0. No other DSR values are supported.

## Result Codes

**OK** Appears when the value is supported.

**ERROR** Appears when the selected value is not recognized or is not supported.

## RI Operation

The RI pin is asserted on detection of an incoming call that the CTA 500*dm* is allowed to accept.

Normal public network cadencing is provided. The RI signal is asserted for 2 seconds, then negated for 4 seconds. This cycle continues until the call is answered, disconnected by the caller, or the CTA 500*dm* resets (for example, assertion of DTR if &D is 2 or 3).

## Calling Line ID

If Calling Line Identification is available on an incoming call and is enabled, a single indication is provided both with the first RING indication and when the RI signal is asserted.

The indication occurs in one of two formats. The first is an additional string of numbers that appears with the RING indication. For example, if the calling number is 123-4567, the first RING

indication is modified to be RING:1234567. This is called the *concatenated* format.

The second format is a Tag = Value pair, where the only supported tag is NMBR. The same example would return the string NMBR = 1234567 on its own line after the first RING indication.

A query may be sent during ringing that returns the calling line ID information. This feature is independent of the delivery enable feature.

## Calling Line ID commands summary

Command	Description	Value
@N1=n	calling line ID delivery control	0 disabled (default) 1 enable concatenation format 2 enable tag and value format
@Q	calling line ID query	

## Calling Line ID Delivery Control

The Calling Line ID Delivery Control Command

@N1=value

controls whether calling line ID is delivered on incoming calls.

Value 0 (the default) disables calling line ID delivery. Value 1 enables calling line ID delivery using the concatenated format. Value 2 enables calling line ID delivery using the tag and value format.

## Result Codes

**OK** Appears when the value is understood and calling line ID is supported.

**ERROR** Appears when the selected value is not recognized or is not supported.

## Calling Line ID Query

The Calling Line ID Query Command

@Q

returns an ASCII string containing the calling line ID information. This command is valid only during incoming calls and is independent of the Calling Line ID Delivery Control.

If the calling line ID is unknown, the returned string is UNKNOWN. There is no numeric form to the UNKNOWN string. If the calling line ID is known, it is returned as a single text string, as in the concatenated format of the Calling Line ID Delivery Control.

### Result Codes

**OK** Appears when the calling line request is valid.

**ERROR** Appears when the command could not be completed; for example, when there is no incoming call.

*Note:* The absence of calling line ID information is not an error condition.

## Caller ID Security

Caller ID security provides either call screening or call blocking based on a list of numbers entered by the user. Call screening accepts calls from numbers that are on the list while call blocking accepts calls from numbers that are not on the list. If Caller ID security is disabled all calls are accepted.

The Caller ID security list holds up to ten numbers with a maximum length of 13 digits. You can use “?” as a wild card character. Incoming calls are compared to the numbers in the list, from right to left, and accepted or blocked as applicable. For instance, a stored number of “535?8” will accept calls from “5-3538” and “5-3578” but not from “5-3523”.

*Note:* Call screening and call blocking cannot be enabled simultaneously.

## Caller ID security commands summary

Command	Description	Value
@Sn	select CLID security mode	0 disabled (default) 1 enable CLID screening mode 2 enable CLID blocking mode
@A=n	add specified number to CLID security list	
@D=n	remove specified number from CLID security list	
@C	clear all stored numbers	
&V4	display stored numbers	

## Caller ID Security Mode Selection

The Caller ID Security Mode Selection Command

@Svalue

allows enabling of either CLID screening or blocking, or to disabling of Caller ID security altogether.

Value	Use
0	disable Caller ID security (default)
1	enable CLID screening
2	enable CLID blocking

## Result Codes

**OK** Appears when the value is understood and calling line ID is supported.

**ERROR** Appears when the selected value is not recognized or is not supported.

## Add Number

The Add Number Command

@A=number



allows addition of a number to the Caller ID security list. You can store up to ten 13-digit numbers in the list.

### Result Codes

**OK** Appears when the number is successfully added to the list.

**ERROR** Appears when the list contains ten numbers or the number is longer than 13 digits.

### Delete Number

The Delete Number Command

@D=number

allows removal of a number from the Caller ID security list.

### Result Codes

**OK** Appears when the number is successfully removed from the list.

**ERROR** Appears when the specified number is not on the list.

### Clear List

The Clear List Command

@C

allows removal of all numbers from the Caller ID security list.

### Result Code

**OK** Appears when the list is cleared.

### View List

The View List Command

&V4

allows viewing of the numbers in the list.

See [“View Parameters” on page 38](#) for more information.

## Summary of AT commands

Command	Description	Value
&Fn	load active profile from factory profile	0 factory profile (default) 1 user profile
Zn	load active profile from stored profile	0 factory profile 1 user profile (default)
&Yn	select profile to load into active profile on power-up	0 factory profile (default) 1 user profile
&W	save active profile to memory	
O	return to On-line Data State	
Yxxxx	enter Download State	XXXX=Nor*
In	request identification	0 product ID (default) 1 boot software revision 2 download software version 3 unique identifier 4 capability string 6 CTI MUX mode query 9 PnP identification string
&Vn	view stored parameters	0 all profiles (default) 1 stored dial strings 4 stored Caller ID Security list
En	set echo command	0 turn echo off 1 turn echo on (default)
&Zn=	save dial string	locations 0-9 (default 0)
&Zn?	display saved dial string	locations 0-9 (default 0)
Vn	verbose control	0 numeric indications 1 full indications (default)
Qn	result code control	0 result codes are sent (default) 1 result codes are suppressed

Command	Description	Value
Xn	call monitoring result code selection	0 connect only 1 connect rate only 2 connect rate only 3 connect rate and busy 4 connect rate and busy (default)
Sn=	set value to S-register	depends on register
Sn?	query S-register value	
S0	number of rings until answer	0-255 (default 1)
S1	ring count (read only)	0-255 (default 0)
S2	escape character	0-127 (default 43) 128-255 (disables escape sequence)
S3	carriage return character	0-127 (default 13)
S4	line feed character	0-127 (default 10)
S5	back space character	0-127 (default 8)
S7	wait for connection	1-255 in seconds (default 30)
S10	DCD drop time	1-255 in tenths of a second (default 14)
S12	guard time	0-255 in fiftieths of a second (default 50)
S25	DTR detect time	0-255 in hundredths of a second (default 5)
S26	RTS to CTS time	0-255 in hundredths of a second (default 1)
Dx	originate a call	valid dial string or strings
A	answer a call	
H	disconnect from current call	
Dx	originate a call	valid dial string or strings

Command	Description	Value
%A98=n	set outgoing call type	0 data bearer service (default) 1 3.1 kHz audio bearer service 2 speech bearer service
%A4=n	select speed of TCM channels, outgoing calls	0 64 kbit/s 1 56 kbit/s (default)
%A93=n	set speech bearer call answer	0 disabled (default) 1 enabled
%A94=n	set 3.1 kHz audio bearer call answer	0 disabled (default) 1 enabled
%A95=n	set data bearer call answer	0 disabled (default) 1 enabled
%A5=n	select speed of TCM channels, incoming voice bearer service calls	0 64 kbit/s 1 56 kbit/s (default)
%A2=n	select rate adaptation protocol	95 PPP async-to-sync conversion 96 MP
@B0=n	set number of links in MP bundle	1 single channel used 2 both channels used (default)
&P2=n	serial interface rate	0 autobauding 1,200 2,400 4,800 9,600 19,200 38,400 57,600 115,200 (default)
&P3=n	serial interface parity	0 none (default) 1 odd 2 even
&P4=n	serial interface data bits per character	7-8 (8 is default)

Command	Description	Value
&P6=n	serial interface stop bits per character	0 one stop bit (default) 1 one and one-half stop bits 2 two stop bits
\Qn	serial interface flow control	0 none 1 bidirectional XON/XOFF 2 not supported 3 bidirectional RTS/CTS (default) 4 not supported
&Cn	DCD operation	0 always on 1 tracks connection (default) 2 always on, except temporarily after disconnect
&Dn	DTR operation	0 ignored (default) 1 enter command state 2 hang-up and disable auto while DTR is down 3 hang-up and reset port
&Rn	CTS operation	0 CTS follows RTS 1 CTS is always on when on-line (default)
&Sn	DSR operation	0 DSR is always on (default)
@N1=n	calling line ID delivery control	0 disabled (default) 1 enable concatenation format 2 enable tag and value format
@Q	calling line ID query	
@Sn	select CLID security mode	0 disabled (default) 1 enable CLID screening mode 2 enable CLID blocking mode

<b>Command</b>	<b>Description</b>	<b>Value</b>
@A=n	add specified number to CLID security list	
@D=n	remove specified number from CLID security list	
@C	clear all stored numbers	
&V4	display stored numbers	

# Troubleshooting

## Power problem?

### **There is no power to the CTA 500dm.**

- Make sure that the power adapter is securely plugged into the CTA 500dm.
- Make sure that the power adapter is plugged into a live outlet.

### **There is power but the CTA 500dm cannot establish a link.**

- Make sure that the TCM cable is connected.
- Check that the LED is on. See [“CTA 500dm LED” on page 82](#) for more information.
- Perform a device restart.

## LED problem?

### **The LED is flashing quickly on power-up.**

- The CTA 500dm has lost its software and is waiting for a file transfer of new software. See [“Configuration” on page 11](#) for instructions on reloading the CTA 500dm software. The software file is on the CTA 500dm installation disk.

### **The LED is flashing slowly and the Dial Command always returns ERROR.**

- The CTA 500dm has lost its connection with the ICS. Check the connection from the CTA 500dm to the ICS.
- Check that the ICS is working.

- If the cable is faulty or the ICS is down, the attached phone will also not work.

### **AT command problem?**

#### **The CTA 500dm does not respond to AT commands sent from your PC.**

- Make sure that your PC, terminal or other DTE is configured correctly.
- Check the DTE connection. If the DTE is configured as a DCE you may need a null modem cable.
- Check that your PC or DTE is configured to expect CD and CTS signals. See [“Serial Interface Control Lines” on page 56](#) for more information.
- Check that the CTA 500dm is in the command mode.
- Check that your PC or DTE is configured to provide a DTR signal. See [“Serial Interface Control Lines” on page 56](#) for more information.
- If the LED is flashing quickly, refer to the [Configuration](#) section of this document.
- Check that the CTA 500dm serial port is set to the correct baud rate (115200 is required for all cases except during a software upgrade) using [“Serial Interface Rate” on page 54](#).

#### **Echoed AT commands from the CTA 500dm do not appear correctly on your PC, but the response messages appear correctly.**

- Check the echo option on your PC.
- Disable echo if your PC displays duplicate characters. Enable echo if your PC does not display any characters.
- See [“Set Local Echo” on page 38](#) for more information.

#### **AT response messages do not appear correctly on your PC but AT commands appear correctly.**

- If numbers are being returned to the PC instead of messages, change the message code setting on the CTA 500dm. See [“Verbose Control” on page 40](#) for more information. The numeric responses and indications are shown in [“Numeric CTA 500dm responses” on page 83](#).
- Make sure that your terminal is operating in full duplex mode rather than half duplex mode.



**AT commands do not appear.**

- To see the commands that you type in a HyperTerminal window, you must Disconnect, then Connect again.

**Using HyperTerminal, the message “Unable to open COMx port” appears.**

- The CTA 500dm may be in use by another application (for instance, Dial-Up Networking).

**Data call problem?****Data calls are not answered automatically.**

- Make sure that rings until answer S0 is not set to 0. See [“S-registers” on page 41](#) for more information.
- If the rings until answer value is too high, the calling device may time out.

**Data calls are answered but are terminated too soon.**

- Make sure that you are calling the correct device.
- Make sure that the remote device is set to the same rate adaptation protocol as the CTA 500dm. See [“Rate adaptation protocol specifications” on page 80](#) for more information.
- Make sure that the proper authentication protocols are used at both ends and that your ID and password are correct.
- If the data rate is set to 64 kbit/s, the network may not be able to support 64 kbit/s. Try connecting at 56 kbit/s. See [“Outgoing Call Control commands summary” on page 47](#) to change your data rate.

**The CTA 500dm rejects calls.**

- Make sure the CTA 500dm is configured to accept calls and that the call type (bearer capability) and call rate are set correctly. See [“Incoming Call Control commands summary” on page 49](#) for more information.
- “Allow caller access” may not be enabled in [Installing Dial-Up Server](#) configuration.

**The CTA 500dm aborts calls when dialing.**

- This may be the any key abort feature of the dial command. See [“Dial Command” on page 44](#) for more information.
- The CTA 500dm may not be seizing a line. Check that the correct line pool code or external dial digit is used in Dialing

properties. Ensure “Use country and area code” is deselected if using MP with two dial out numbers.

**The PC receives bad data after a data call connection.**

- Make sure that the CTA 500*dm* and the remote device are set to the same rate adaptation protocol. See “[Rate adaptation protocol specifications](#)” on page 80 for more information.
- The remote device may be configured for synchronous transmission. The CTA 500*dm* does not support synchronous operation.

**The CTA 500*dm* loses data after a data call connection.**

- Make sure that the CTA 500*dm* and PC flow control methods match. See “[Flow Control](#)” on page 57 for more information.

**The CTA 500*dm* hangs up during a data call.**

- Check the setting of the DTR pin. See “[DTR Operation](#)” on page 59 for more information.

**Data calls are established but Internal applications time out.**

- Check that the settings under TCP/IP properties match those of your ISP.

**Data calls are made using MP and the connected pop-up says connected@ 128,000 bit/s but only one channel is active.**

- Only one channel may be available at the destination (for instance if the ISP is busy).
- Check that you are subscribing to an MP capable service.
- Only one channel is available in the outgoing line pool.
- You are active on a voice call. If the voice call ends, a 128 kbit/s session will be established.

# Appendix

## Canadian & US Safety Installation Instructions

### Please Read Carefully



**WARNING:** To avoid electrical shock hazard to personnel or equipment damage observe the following precautions when installing telephone equipment:

1. Never install telephone wiring during a lightning storm.
2. Never install telephone jacks in wet locations unless the jack is specifically designed for wet locations.
3. Never touch uninsulated telephone wires or terminals unless the telephone line has been disconnected at the network interface.
4. Use caution when installing or modifying telephone lines.



The exclamation point within an equilateral triangle is intended to alert the user to the presence of important operating and maintenance (servicing) instructions in the literature accompanying the product.








This symbol (if applicable) on the product is used to identify the following important information:

#### **For equipment with internal mains supplies:**

- Mains nominal ac voltage 110-120 V~ ; 50/60 Hz
- Mains nominal ac voltage 220-240 V~ ; 50/60 Hz

**For equipment with external mains adapters:**

**CAUTION:** Intended for use in a protected environment. Use only a Nortel supplied or recommended mains power adapter marked as indicated below:

Mains Supply (Input Voltage)	Output Voltage	Rated Current	Approval Markings	Polarity Marking
240 V ac	9 V dc	0.6 A maximum	CLASS II POWER SUPPLY  CE	-VE  +VE
230 V ac	9 V dc	0.6 A maximum	CLASS II POWER SUPPLY  CE	-VE  +VE
110 V ac	9 V dc	0.6 A maximum	CLASS 2 POWER SUPPLY  OR 	-VE  +VE

The CE marking on the product indicates compliance with the EU Low Voltage Directive (LVD) and the Electromagnetic Compatibility Directive (EMCD).

**Important Safety Instructions****Please Read Carefully**

When using your telephone equipment, basic safety precautions should always be followed to reduce the risk of fire, electric shock and injury of persons, including the following:

1. **Read and understand all instructions.**
2. Follow the warnings and instructions marked on the product.
3. Unplug this product from the wall outlet before cleaning. Do not use liquid cleaners or aerosol cleaners. Use a damp cloth for cleaning.
4. Do not use this product near water, for example, near a bathtub, wash bowl, kitchen sink, or laundry tub, in a wet basement or near a swimming pool.
5. Do not place this product on an unstable cart, stand or table. The product may fall, causing serious damage to the product.
6. This product should never be placed near or over a radiator or heat register. This product should not be placed in a built-in installation unless proper ventilation is provided.

7. Do not allow anything to rest on the power cord. Do not locate this product where the cord will be abused by persons walking on it.
8. Do not overload wall outlets and extension cords as this can result in the risk of fire or electric shock.
9. Never spill liquid of any kind on the product.
10. To reduce the risk of electric shock, do not disassemble this product, but have it sent to a qualified service person when service or repair work is required.
11. Unplug this product from the wall outlet and refer servicing to qualified service personnel under the following conditions:
  - a. When the power supply cord or plug is damaged or frayed.
  - b. If the product has been exposed to rain, water or liquid has been spilled on the product, disconnect and allow the product to dry out to see if still operates; but do not open up the product.
  - c. If the product housing has been damaged.
  - d. If the product exhibits a distinct change in performance.
12. Avoid using telephone equipment during an electrical storm. There may be a remote risk of electric shock from lightning.
13. Do not use the telephone equipment to report a gas leak in the vicinity of the leak.
14. **CAUTION:** To eliminate the possibility of accidental damage to cords, plugs, jacks, and the telephone equipment, do not use sharp instruments during the assembly procedures.
15. **Save these instructions.**

## CANADIAN AND US REGULATIONS

### NETWORK CONNECTION (Canada, United States)

This device complies with the requirements of Part 68 of the FCC Rules and Industry Canada CS03, Issue 8, for connection to the Host equipment (Norstar or Companion equipment) only, and may not be connected directly to the Public Switched Telephone Network (PSTN).

FCC registration number: This equipment complies with Part 68, Rules and Regulations, of the FCC for connection to Host equipment (Norstar or Companion equipment) and may not be connected directly to the Public Switched Telephone Network

(PSTN). The FCC registration number appears on a sticker affixed to the equipment.

For more regulatory information, refer to Norstar Installation Guide that came with your system.

### **EMI/EMC**

*Note:* This device complies with Class A EMI requirements when connected to host equipment that meets Class A and Class B when connected to host equipment that meets Class B. For more information about compliance, refer to Norstar Installation Guide that came with your system.

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

#### **For Class A Host equipment**

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules, and ICES-003 Class A Canadian EMI requirements. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

These limits are designed to provide reasonable protection against harmful interference in a commercial environment.

This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications.

Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

#### **For Class B Host equipment**

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules, and ICES-003 Class B Canadian EMI requirements. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

These limits are designed to provide reasonable protection against harmful interference in a residential installation.

This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications.

However, there is no guarantee that interference will not occur in a particular installation.

If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

### **WARRANTY INFORMATION**

Do not attempt to repair this equipment. If you experience trouble, call or write for warranty and repair information.

#### **Address for warranty and repairs in the United States:**

Nortel (Northern Telecom)  
640 Massman Drive,  
Nashville, TN, 37210  
USA

For more information call 1-800-4NORTEL

#### **Address for warranty and repairs in Canada:**

Nortel (Northern Telecom)  
30 Norelco Drive  
Weston, Ontario, M9L 2X6  
Canada

For more information call 1-800-4NORTEL.

## Rate adaptation protocol specifications

The CTA 500*dm* supports two rate adaptation protocols. These protocols allow data leaving the computer to be properly carried over the network to another computer or LAN.

The CTA 500*dm* supports the following protocols:

- **Point-to-Point Protocol**
- **Multilink PPP**

### Point-to-Point Protocol

PPP is used when only a single channel is desired.

When using PPP for dial-up connections, any of the standard authentication protocols (such as Password Authentication Protocol (PAP) and Challenge-Handshake Authentication Protocol (CHAP)), and any of the standard PPP compression protocols can be used. The CTA 500*dm* automatically uses any of these protocols, so there is no need to configure the CTA 500*dm*.

The CTA 500*dm* can also accept incoming calls when set to PPP operation.

*Note:* PPP used by the CTA 500*dm* is asynchronous-to-synchronous conversion.

### Multilink PPP

MP is a protocol that is used to link multiple channels that use PPP. When used with the CTA 500*dm*, MP allows your computer to connect to the network using 1 or 2 channels. However, the link between the CTA 500*dm* and your computer uses only a single channel. Because of this, the CTA 500*dm* has to make certain **Link Assumptions** about the operation of the links, and it negotiates link operation so that MP can be used.

MP can be enabled or disabled for incoming calls as well as outgoing calls. MP requires two phone numbers for outgoing calls. If the telephone numbers are the same, only one number needs to be specified in the dial command. If the telephone numbers are different, the & character must be used in the dial command (see **“Dial Command”** on page 44 for more information).

When using MP, the only supported authentication protocol is PAP. The use of PAP is automatically detected by the CTA 500*dm*. If any



other authentication protocol is selected, the CTA 500*dm* will not be able to use MP and the call must be redialed using PPP.

### **Link Assumptions**

For PPP and MP, it is assumed that the links are CRC-16 with Maximum Receive Units (MRU) less than 1750 bytes.

For MP, it is assumed that call back is not required and that both links can be identically configured.

## **Bearer Capabilities**

The use of ISDN and digital networks allows a user to select a number of different bearer capabilities and data rates. Using a bearer capability gives the network information about how it should treat the call. In general, data cannot be sent over one of the voice bearer capabilities (3.1 kHz audio and speech). However, in some cases, especially on local calls, it may be possible to support 56 kbit/s and even 64 kbit/s data rates over voice calls. The CTA 500*dm* supports this capability.

To do this, your ISP must set up special dial-in phone numbers. Ask your ISP about this feature if you are using CTA 500*dm* where data calls are more expensive than voice calls.

## CTA 500dm LED

The status LED is on the back of the CTA 500dm. It provides information about the current state of the CTA 500dm and the B-channels based on its flashing pattern.

The following table shows the LED flashing patterns and CTA 500dm states.

LED Pattern	CTA 500dm State	B-channel State
continuous on	Idle	both idle
single blink on	Active	one channel active
double blink on	Active	both channels active
single blink off	off-line (error or powering up)	not available
fast blink	waiting for file download (refer to "Installing CTA 500dm and Norstar TAPI Service Provider software" on page 12)	not available
slow blink	out-of-sync (network not available) (refer to "Power problem?" on page 71)	not available

## Numeric CTA 500dm responses

Numeric response	Indication
0	OK
1	RING
2:number	RING:number
3	NO CARRIER
4	ERROR
6	NO DIALTONE (not used)
7	BUSY
56	CONNECT 56000
64	CONNECT 64000
112	CONNECT 112000
120	CONNECT 120000 (if supported)
128	CONNECT 128000
1000	SEND PROGRAM FILE USING YMODEM-G

## Initialization strings

The following table shows some suggested initialization strings. In all examples, Flow Control is set to hardware (\q3) and DTR Operation is set to hang up (&d2).

Protocol	Bearer service	Rate (kbit/s)	Initialization string
PPP	data	64	\q3 &d2 %a2=95 %a98=0 %a4=0
PPP	data	56	\q3 &d2 %a2=95 %a98=0 %a4=1
PPP	audio	56	\q3 &d2 %a2=95 %a98=1 %a4=1
MP, 1 channel	data	64	\q3 &d2 %a2=96 @B0=1 %a98=0 %a4=0
MP, 2 channel	speech	112	\q3 &d2 %a2=96 @B0=2 %a98=2 %a4=1

## DB-25 and DB-9 signal summary

The following tables show which DB-25 and DB-9 pins are used by the CTA 500*dm* and what the signals are used for by the CTA 500*dm*.

### DB-25 connection

DB-25 pin	RS-232 function	CTA 500 <i>dm</i> function
1	Shield	Shield
2	Transmitted Data	TD
3	Received Data	RD
4	Request to Send/Ready for Receiving	RTS
5	Clear to Send	CTS
6	DCE Ready	DSR
7	Signal Common	GND
8	Received Line Signal Detector	DCD
12	Secondary Received Line Signal/Detector/ Data Signal Rate Selector (DCE Source)	–
13	Secondary Clear to Send	–
14	Secondary Transmitted Data	–
16	Secondary Received Data	–
18	Local Loopback	–
19	Secondary Request to Send	–
20	DTE Ready	DTR
22	Ring Indicator	RI
23	Data Signal Rate Selector (DCE/DTE Source)	–
24	Transmitter Signal Element Timing (DTE Source)	no
25	Test Mode	no

**DB-9 connection**

<b>DB-9 pin</b>	<b>RS-232 function</b>	<b>CTA 500dm function</b>
1	Received Line Signal Detector	DCD
2	Received Data	RD
3	Transmitted Data	TD
4	DTE Ready	DTR
5	Signal Common	GND
6	DCE Ready	DSR
7	Request to Send/Ready for Receiving	RTS
8	Clear to Send	CTS
9	Ring Indicator	RI

**Acronyms used in this document**

ATM—Asynchronous transfer mode

CHAP—Challenge Handshake Authentication Protocol

CSA—Canadian Standards Association

CTA 500dm—Computer Telephony Adapter digital modem modulator/demodulator)

CTI—Computer Telephony Integration

DN—Directory Number

DTE—Data Terminal Equipment

FCC—Federal Communications Commission

ICS— Integrated Communication System

IEC—InterExchange Carrier

IP—Internet Protocol

ISDN—Integrated Services Digital Network

ISP—Internet Service Provider

ITC—Independent telephone company

kbit/s—Kilobits per second

LAN—Local Area Network

LED—Light Emitting Diode

MP—Point-to-Point Protocol/Multi-link Protocol

MRU—Maximum Receive Units

PAP—Password Authentication Protocol

PPP—Point-to-Point Protocol

PSDN—Public Switched Digital Network

PSTN—Public Switched Telephone Network

TA—Terminal Adapter

TAPI SP—Telephony Application Programming Interface Service Provider

TCP/IP—Transmission Control Protocol and Internet Protocol

UART—Universal asynchronous receiver/transmitter

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