

# **TA 544**

## **User Manual**

1200704L1  
4200704L3

TA 544  
TA 544 with SDSL Card

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**NOTE**

*Notes provide additional useful information.*



**CAUTION**

*Caution signify information that could prevent service interruption.*

**WARNING**

*Warnings provide information that could prevent damage to the equipment or endangerment to human life.*

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When using your telephone equipment, please follow these basic safety precautions to reduce the risk of fire, electrical shock, or personal injury:

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2. Follow all warnings and instructions marked on the product.
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**WARNING**

*To prevent electrical shock, do not install equipment in a wet location or during a lightning storm.*

**Save These Important Safety Instructions**

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ADTRAN will replace or repair this product within 5 years from the date of shipment if the product does not meet its published specification, or if it fails while in service.

A return material authorization (RMA) is required prior to returning equipment to ADTRAN. For service, RMA requests, training, or more information, see the toll-free contact numbers given below.

### ***Presales Inquiries and Applications Support***

Please contact your local distributor, ADTRAN Applications Engineering, or ADTRAN Sales:

Applications Engineering	(800) 615-1176
Sales	(800) 827-0807



*If any of the phone numbers listed on these two pages are not accessible, dial (256) 963-8000 and ask the operator to connect you directly to the department you wish to reach.*

### ***Post-Sale Support***

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Technical Support	(888) 4ADTRAN
-------------------	---------------

The Custom Extended Services (ACES) program offers multiple types and levels of service plans which allow you to choose the kind of assistance you need. For questions, call the ACES Help Desk.

ACES Help Desk	(888) 874-2237
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### ***Repair and Return***

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CAPS Department (256) 963-8722

Identify the RMA number clearly on the package (below address), and return to the following address:

ADTRAN Customer and Product Service  
901 Explorer Blvd.  
Huntsville, Alabama 35806  
RMA # \_\_\_\_\_

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Training (800) 615-1176, ext. 7500



## TA 544 SERIES IAD USER MANUAL

This document is designed for use by network administrators and others who will configure and provision the Total Access® 544. It contains overview information, information about navigating the VT 100 user interface, configuration information, and menu descriptions.

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## 1. TA 544 OVERVIEW

The Total Access 544 is a complete solution Integrated Access Device (IAD) for Voice over ATM (VoATM) applications. The unit includes a modular network interface, Nx64 V.35 interface, 10/100BaseT interface, ISDN ports, and an optional battery back-up (1200641L1) for added security. The TA 544 can provision, test, and provide status for any of the voice and data interfaces. All connections are made via the rear panel (see Figure 1). In addition to a built-in IP router, the TA 544 contains an Echo Canceller necessary for VoATM applications.

Appendix A, on page 49, contains detailed specifications for the TA 544.

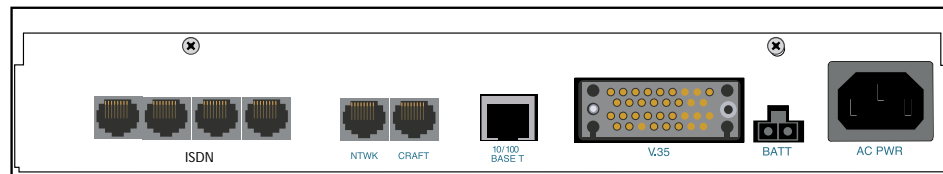


Figure 1. TA 544 Rear Panel

### Firmware Updates

Firmware can be updated by using XMODEM transfer protocol via the unit's **CRAFT** port (see Figure 1) or by using TFTP from a network server. (See Appendix B on page 51 and Appendix C on page 54.)

### Terminal Menu

The terminal menu is the access point to all other operations. Each terminal menu item has several functions and sub-menus that identify and provide access to specific operations and parameters. These menu selections are described later in this User Manual.



*See Appendix D on page 57 for instructions about navigating the terminal menus.*

## 2. VOICE OVER DSL OVERVIEW

Voice over DSL (VoDSL) refers to providing toll quality voice access to the Public Switched Telephone Network (PSTN) over twisted copper pair using DSL. Data can be combined with multiple voice lines over a single medium via DSL, thus yielding many advantages over traditional TDM technologies.

Traditional TDM technologies are limited by statically allocating bandwidth. DSL overcomes this by providing a large bandwidth and utilizing other technologies, such as ATM, to dynamically assign bandwidth as it is needed. Because of this, the user is able to add voice and data connections over a DSL line with flexibility and ease.

## 3. VOICE OVER ATM OVERVIEW

Voice over ATM is the technology used to transmit voice conversations over a data network using Asynchronous Transfer Mode (ATM). There are several potential benefits to moving voice over a data network using ATM. First, the

small, fixed-length cells require lower processing overhead. Second, these small, fixed-length cells allow higher transmission speeds than traditional packet switching methods.

ATM allocates bandwidth on demand, making it suitable for high-speed connection of voice, data, and video services. Conventional networks carry data in a synchronous manner. Because empty slots are circulating even when the link is not needed, network capacity is wasted. ATM automatically adjusts the network capacity to meet the system needs.

#### 4. VOICE OVER DSL APPLICATION

Figure 2 shows a typical VoDSL application. The TA 544 connects to the ATM network, via a DSLAM, to provide both voice and high speed data from a single platform.

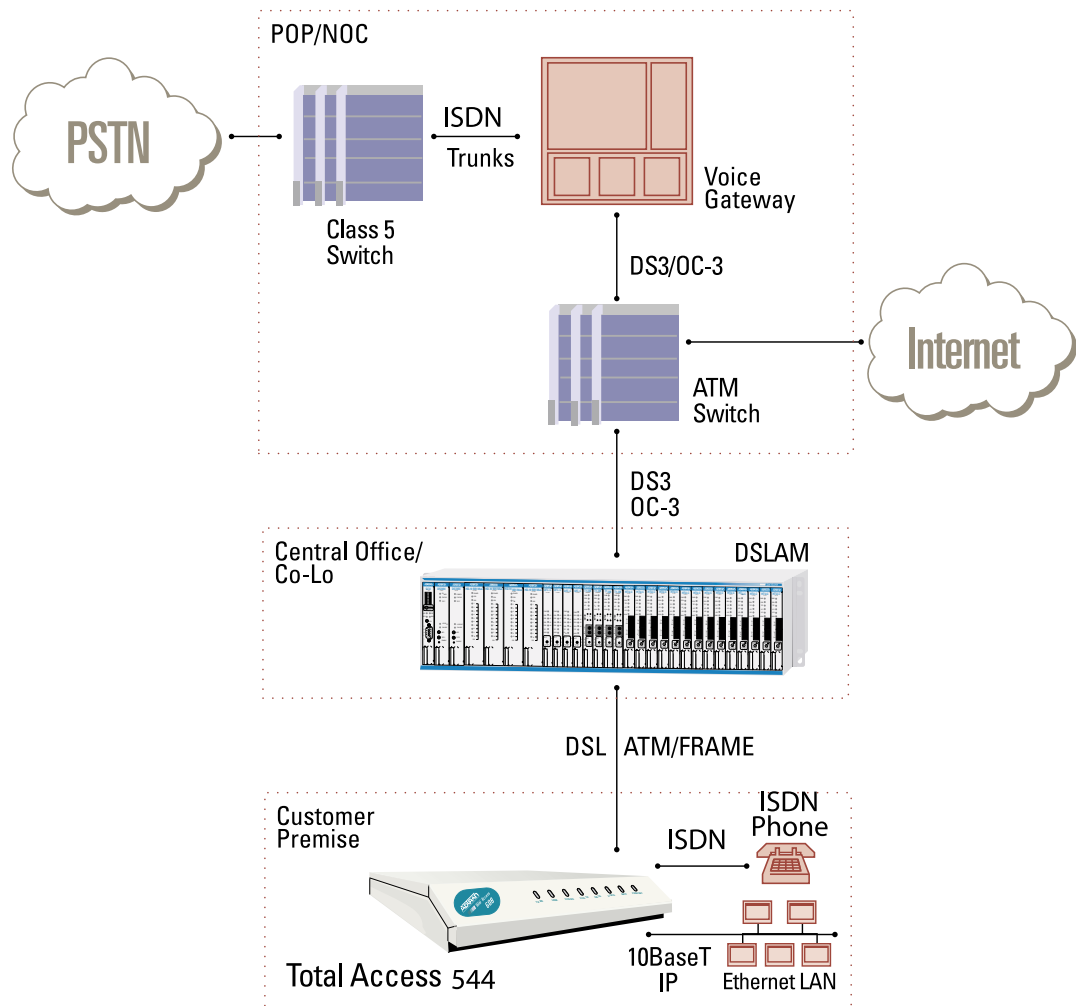


Figure 2. Voice over DSL

## 5. INSTALLATION

### Unpack and Inspect the Unit

After unpacking the unit, inspect it for possible shipping damage. If the equipment has been damaged in transit, immediately file a claim with the carrier, then contact ADTRAN Customer Service.

### ***Shipped by ADTRAN***

The following items are included in the ADTRAN shipment:

- The TA 544
- DB-9 adapter
- 6 ft. RJ-45 to RJ-45 cable
- 2 wall mount hinges
- 4 each 6-32 screws
- AC power cord
- CD containing User Manual

### ***Provided by Customer***

The following items must be supplied by the customer:

- Cables and connectors used for your application
- Screws to mount the TA 544 to the wall (if applicable)



*Double pole/neutral fusing.*

### Mount the Unit

1. Use a #2 Phillips-head screwdriver to insert the 4 each 6-32 screws (all screws are provided with the unit) to secure the bracket to the unit.
2. Use an appropriate screw (wood/metal) (provided by the user) to secure the unit to the wall.
3. Plug the unit into a grounded outlet.

## 6. CONFIGURING THE TA 544

### System Info

The **SYSTEM INFO** menu provides basic information about the unit and contains data fields for editing information. Figure 3 displays the submenus available when you select this menu item.

```
TA 544 IAD/System Info
System Info  System Name
System Config System Location
System Utility System Contact
WAN          Unit Name          TA 544 IAD
Router       CLEI Code
Voice        Part Number          1200704L1
Modules      Serial Number
             Firmware Revision 1.04.06
             Bootcode Revision  0.06
             System Uptime   29 secs
             Date/Time     Monday January 1 00:00:29 1900

MODE: SDSL IAD                               N1: down
                                           ^Z=help 0:00
```

Figure 3. System Information Menu

#### > **System Name**

Provides a user-configurable text string for the name of the TA 544. This name can help you distinguish between different installations. You can enter up to 40 alpha-numeric characters in this field, including spaces and special characters (such as an underbar). This name will appear on the top line of all screens.

#### > **System Location**

Provides a user-configurable text string for the location of the TA 544. This field is to help you keep track of the actual physical location of the unit. You can enter up to 40 alphanumeric characters in this field, including spaces and special characters (such as an underbar).

#### > **System Contact**

Provides a user-configurable text string for a contact name. You can use this field to enter the name, phone number, or email address of a person responsible for the TA 544 system. You can enter up to 40 alpha-numeric characters in this field, including spaces and special characters (such as an underbar).

#### > **Unit Name**

Product-specific name for the product assembly.

#### > **CLEI Code**

CLEI code information.



> **Part Number**

ADTRAN part number for the product assembly.

> **Serial Number**

Serial number of the product assembly.

> **Firmware Revision**

Displays the current firmware revision level of the controller.

> **Bootcode Revision**

Displays the bootcode revision.

> **System Uptime**

Displays the length of time since the TA 544 system reboot.

> **Date/Time**

Displays the current date and time, including seconds. This field can be edited. Enter the time in 24-hour format (such as 23:00:00 for 11:00 pm). Enter the date in mm-dd-yyyy format (for example, 10-30-1998).



*Each time you reset the system, this value resets to 0 days, 0 hours, 0 min and 0 secs.*

## System Config

Set up the TA 544 operational configuration from the **SYSTEM CONFIG** menu. Figure 4 shows the items included in this menu.

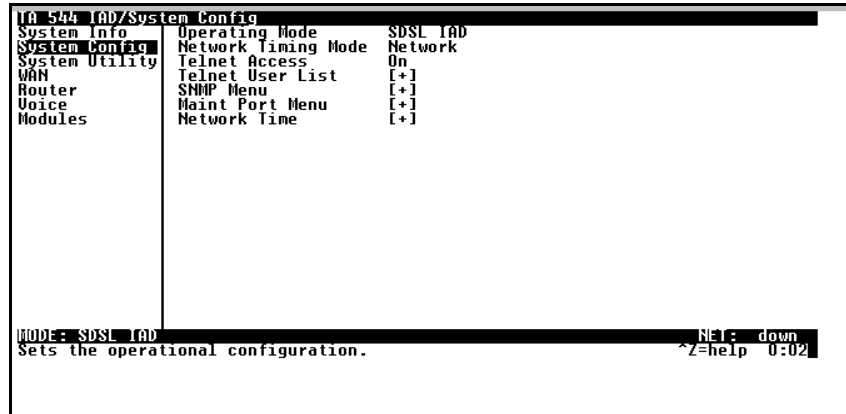


Figure 4. System Configuration Menu

### > **Operating Mode**

The operating mode is set automatically.

### > **Network Timing Mode**

Selects the timing source for the entire system. The timing options available are listed below.

#### **Network**

The clock is recovered from the network (WAN interface).

#### **Internal**

The clock is generated internally by the TA 544.

### > **Telnet Access**

Sets Telnet access to **ON** or **OFF**.

### > **Telnet User List**

Up to four users can be configured for access to the TA 544. Each user can be assigned a security level and time out.

#### **Name**

A text string of the user name for this session.

#### **Authen Method**

The user can be authenticated in two ways:

**PASSWORD**      The **PASSWORD** field is used to authenticate the user.

**RADIUS**         The **RADIUS** client is used for authenticating the user.

**Password**

When the authenticating method is password, this text string is used for the password.

**Idle Time (1-255)**

This sets the amount of time you can be idle before you are automatically logged off.

**Level**

This is the security level granted to the user.

**> SNMP Menu**

The TA 544 is an SNMP agent. It can respond to Gets and Sets, and can generate traps. These two lists set up the manager, communities, and levels.

**Access**

When set to **OFF**, SNMP access is denied. When set to **ON** (def), the TA 544 will respond to SNMP managers based on the following lists.

**Communities**

This list is used to set up to eight SNMP communities names that the TA 544 will allow. Factory default sets the community "public" with "Get" privileges.

**Name**

This is a text string for the community name.

**Privilege**

The access for this manager can be assigned three levels.

<b>NONE</b>	No access is allowed for this community or manager.
<b>GET</b>	Manager can only read items.
<b>GET/SET</b>	Manager can read and set items.

**Manager IP**

This is the IP address of SNMP manager. If set to 0.0.0.0, any SNMP manager can access the TA 544 for this community.

**Traps**

The TA 544 can generate SNMP traps. This list allows up to four managers to be listed to receive traps.

**Manager Name**

This is the text string describing the name of the entry. It is intended for easy reference and has no bearing on the SNMP trap function.

**Manager IP**

This is the IP address of the manager that is to receive the traps.

### > **Maint Port Menu**

The TA 544's VT 100 **CRAFT** port can be accessed via an RJ-48 located on the rear panel. The setup for these ports is under this menu.

#### **Password Protect**

When set to **OFF**, the maintenance port is not password protected. When **ON** (def), the TA 544 will prompt for a password upon startup.

#### **Password**

This is the text string that is used for comparison when password protecting the maintenance port. By default, no password is entered.




*If you forget your password, type **CHALLENGE** in all capital letters. Call technical support and have the displayed **CHALLENGE** code ready.*



*The security level for the maintenance port is always set to 0. This gives full access to all menus.*



*Passwords are case-sensitive.*

<b>Instructions for Changing Passwords</b>	
<b>Step</b>	<b>Action</b>
<b>1</b>	Select the <b>PASSWORD</b> field—a new <b>PASSWORD</b> field displays.
<b>2</b>	Type the new password in the <b>ENTER</b> field.
<b>3</b>	Type the new password again in the <b>CONFIRM</b> field.
	<i>The password can contain up to 12 alphanumeric characters. You can also use spaces and special characters in the password.</i>

**Baud Rate**

This is the asynchronous rate that the maintenance port will run. The possible values are 300, 1200, 2400, 4800, 9600 (def), 19200, 38400, and 57600.

**Data Bits**

This is the asynchronous bit rate that the maintenance port will run. The possible values are 7 or 8 (def) bits.

**Parity**

This is the asynchronous parity that the maintenance port will run. The possible values are **NONE** (def), **ODD**, or **EVEN**.

**Stop Bits**

This is the stop bit used for the maintenance port. The possible values are 1 (def), 1.5 or 2.

**> Network Time**

The TA 544 unit time can be entered manually from the **SYSTEM INFO** menu, or the unit can receive time from an NTP/SNTP server. The **NETWORK TIME** menu includes all parameters relating to how the unit communicates with the time server.

**Server Type**

The server type defines which port the TA 544 will listen on to receive timing information from the time server.

**NT Time**

The TA 544 will receive time from an NT server running SNTP software on its TIME port.

**SNTP**

The TA 544 will receive time directly from an SNTP server.

**Active**

This network timing feature can be turned on and off. It determines whether the unit will request and receive time from a time server.

**Time Zone**

There are several time zones available for the time to be displayed in. All time zones are based off of Greenwich Mean Time (GMT).

**Adjust for Daylight Saving**

Since some areas of the world use Daylight Savings Time, the TA 544 is designed to adjust the time on the first Sunday in April and the last Sunday in October accordingly if this option is turned on.

**Host Address**

This is the IP address of the time server that the TA 544 will request and receive time from.

**Refresh**

This is the interval of time between each request the TA 544 sends out to the time server. A smaller refresh time guarantees that the unit receives the correct time from the server and corrects possible errors more quickly, but it is more taxing on the machine. A range of refresh times is available for the user to decide which is best for their unit.

### Status

This displays the current status of the time negotiation process. If an error is displayed, check all connections and configurations to try to resolve the problem.

## System Utility

Use the **SYSTEM UTILITY** menu to view and set the system parameters shown in Figure 5.

```
TA 544 TAD/System Utility
System Info Upgrade Firmware [+]
System Config Config Transfer [+]
System Utility System Utilization [+]
WAN Ping [+]
Router Terminal Mode <+>
Voice
Modules

MODE: SDSL TAD NE1: down
^Z=help 0:02
```

Figure 5. System Utility Menu

### > Upgrade Firmware

Updates firmware when TA 544 enhancements are released. Two transfer methods are available for use in updating the TA 544 system controller.

#### Transfer Method

The two methods for upgrading are **XMODEM** and **TFTP**. (See Appendix B on page 51 and Appendix C on page 54 for more information.) **TFTP** requires a TFTP server running somewhere on the network. The TA 544 starts a TFTP client function which gets the upgrade code from the TFTP server. Selecting **XMODEM** will load the upgrade code through the **CRAFT** port using any PC terminal emulator with xmodem capability.

#### TFTP Server Address

This is required when the transfer method is TFTP. It is the IP address or domain name (if DNS is configured) of the TFTP server.

#### TFTP Server Filename

This is required when the transfer method is TFTP. It is the case-sensitive file name which contains the upgrade code.

#### Transfer Status

This appears when TFTP is used. It displays the status of the transfer as it happens. Any error or success message will be displayed here.

### Start Transfer

This activator is used when the configurable items in this menu are complete.



Before using **START TRANSFER**, the TA 544 should have a valid IP address, subnet mask, and default gateway (if required).

### Abort Transfer

Use this activator to cancel any TFTP transfer in progress.

### TFTP Server

Setting this to **YES** allows another TA 544 to upgrade its code using TFTP client. This, in effect, turns on the TA 544 TFTP server function and allows its code to be “cloned.” Setting to **NO** (def) will deny any request from TFTP clients.

## > Config Transfer

Sends a file containing the TA 544 configuration to a PC connected to the **CRAFT** port using XMODEM protocol or to a file on a TFTP server using the TFTP protocol. See *Appendix B. Updating TA 544 Firmware using XMODEM* on page 51 and *Appendix C. Updating TA 544 Firmware using TFTP* on page 54 for details.

**CONFIG TRANSFER** also lets you save the TA 544 configuration as a backup file, so you can use the same configuration with multiple TA 544 units. In addition, **CONFIG TRANSFER** can retrieve a configuration file from a TFTP server.

To support these transfers, ADTRAN delivers a TFTP program with the TA 544 called *TFTP Server*. You can configure any PC running Microsoft Windows with this software, and store a configuration file.



Before using **CONFIG TRANSFER**, the TA 544 should have a valid IP address, subnet mask, and default gateway (if required).

Only one configuration transfer session (upload or download) can be active at a time.

### Transfer Method

Displays the method used to transfer the configuration file to or from a server. XMODEM and TFTP are supported.

### Transfer Type

Only **BINARY** transfers are currently supported.

### TFTP Server IP Address

Specifies the IP address of the TFTP server. Get this number from your system administrator.

### **TFTP Server Filename**

Defines the name of the configuration file that you transfer to or retrieve from the TFTP server. The default name is **ta544.cfg**, but you can edit this name.

### **Current Transfer Status**

Indicates the current status of the update.

### **Previous Transfer Status**

Indicates the status of the previous update.

### **Load and Use Config**

Retrieves the configuration file specified in the **TFTP SERVER FILENAME** field from the server. To start this command, enter **Y** to begin or enter **N** to cancel.



*If you execute this command, the TA 544 retrieves the configuration file, reboots, then restarts using the new configuration.*

### **Save Config Remotely**

Saves the configuration file specified in **TFTP SERVER FILENAME** to the server identified in **TFTP SERVER IP ADDRESS**. To start this command, enter **Y** to begin or enter **N** to cancel.



*Before using this command, you must have identified a valid TFTP server in **TFTP SERVER IP ADDRESS**.*

### **> Ping**

Allows you to send pings (ICMP requests) to hosts. The following items are under this menu:



*Only one ping session can be active at a time.*

### **Start/Stop**

Activator to start and cancel a ping test.

### **Host Address**

IP address or domain name (if DNS is configured) of device to receive the ping.

### **Size (40-1500)**

Total size of the ping to send. Range is 40 (def) to 1500 bytes.

### **# of Packets**

Total packets to send every 2 seconds. Setting this to **0** allows the client to ping continuously.



**# Transmits**

Total packets sent (read only).

**# Receives**

Total packets received (read only).

**%Loss**

Percentage loss based on ping returned from host (read only).

## Configuring WAN Settings

### > DSLAM Type

Set this to the type of DSLAM the TA 544 will be connecting to.

### > Layer One Interface

This is the physical layer protocol used to connect the DSLAM to the TA 544.

### > Layer Two Protocol

This is the data link layer protocol used to connect the DSLAM to the TA 544.

### > ATM Config

Use the **WAN** menu (Figure 6) to access the **ATM CONFIG** menu.

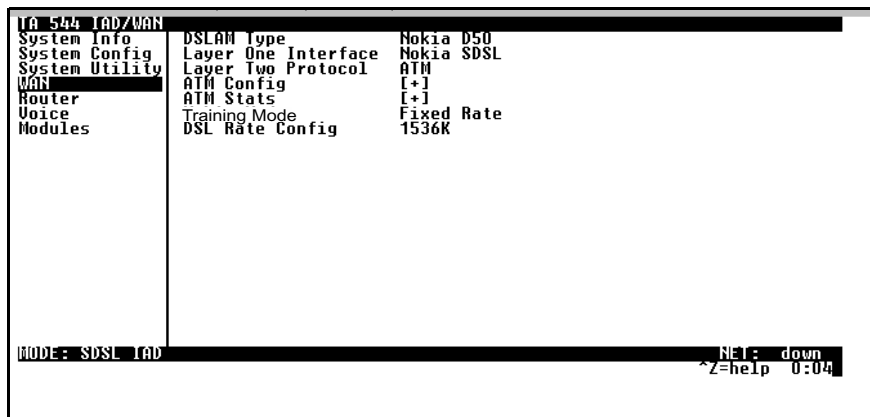


Figure 6. WAN Menu

Use the **ATM CONFIG** menu (Figure 7) to set the parameters listed below the figure.

```
TA 544 AD/WAN/ATM Config
ATM Config Idle Cells ITU (Idle)
ATM Stats Data Scrambling Disabled

MODE: SDSL TAD
Help: down
^Z=help 0:05
```

**Figure 7. ATM Config Menu**

#### Idle Cells

The **IDLE CELLS** format must be configured for either **ATM FORUM** or **ITU**. Configuring this setting incorrectly for a particular circuit will cause poor performance at the ATM layer.



*This setting must match the configuration setting of the ATM switch or DSLAM at the other end of the circuit.*

#### Data Scrambling

**DATA SCRAMBLING** can be **ENABLED** or **DISABLED** for cell traffic. Configuring this setting incorrectly for a particular circuit will cause poor performance.



*This setting must match the configuration setting of the ATM switch or DSLAM at the other end of the circuit.*

#### > ATM Stats

Use the **WAN** menu (Figure 6 on page 25) to access the **ATM STATS** menu (Figure 8 on page 27) and view the parameters listed below the figure.

```
TA 544 IAD/MAN/ATM Stats
ATM Config AP: TxCells 0
ATM Stats AP: RxCells 0
          AP: RxOAMCells 0
          AP: ReceiveCellsDiscarded 0
          AP: ReceiveCellErrors 0
          AP: Sync Inactive
          AP: OutOfCellDelineation 0
          AAL5: TransmitFrames 0
          AAL5: ReceiveFrames 0
          AAL5: TransmitDiscardedFrames 0
          AAL5: ReceiveErrors 0
          AAL5: ReceiveDiscardedFrames 0
          AAL5: NoAtmFrames 0
          AAL5: NoDataPackets 0
          Clear Stats <+>

MODE: SDSL IAD NET: down
          ^Z=help 0:06
```

Figure 8. ATM Stats Menu

**AP: Tx Cells**

This is the number of cells transmitted.

**AP: Rx Cells**

This is the number of cells received.

**AP: Rx OAM Cells**

This is the number of OAM cells received

**AP: Receive Cells Discarded**

This is the number of cells received and discarded. An incrementing count in this field could indicate a configuration problem with the ATM layer.

**AP: Receive Cell Errors**

This is the number of cells received with an HEC error.

**AP: Sync**

This indicates cell delineation at the ATM layer.

**AP: Out Of Cell Delineation**

This indicates loss of cell delineation at the ATM layer.

**AAL5: Transmit Frames**

This is the number of AAL5 frames transmitted.

**AAL5: Receive Frames**

This is the number of AAL5 frames received.

**AAL5: Transmit Discarded Frames**

This is the number of AAL5 frames discarded.

**AAL5: Receive Errors**

This is the number of AAL5 errors received.

**AAL5: Receive Discarded Frames**

This is the number of AAL5 frames discarded.

**AAL5: No ATM Frames**

This is for internal use only.

**AAL5: No Data Packets**

This is for internal use only.

**Clear Stats**

This is used to clear the counters on this menu screen.

**> DSL Rate Config**

This is the bit rate the SDSL link has trained to.

## Configuring the Router – Configuration

Use the **ROUTER/CONFIGURATION** menu (Figure 9) to access the **GLOBAL**, **ETHERNET**, and **WAN** menus.

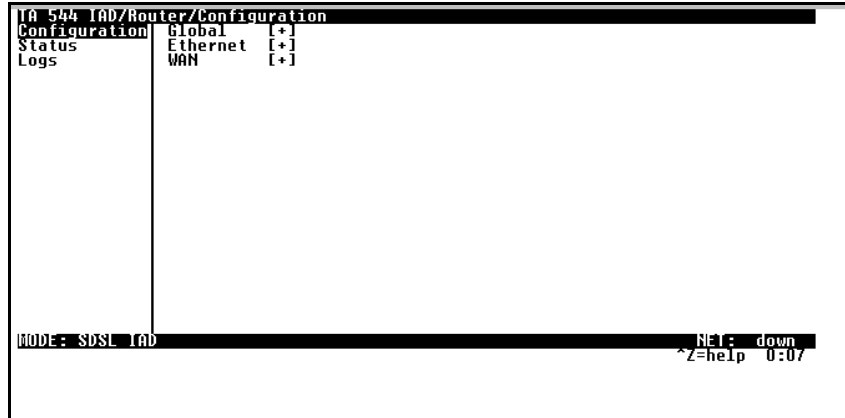


Figure 9. Router/Configuration Menu

### > Global

Use the **GLOBAL** menu (Figure 10) to set up general router functions.

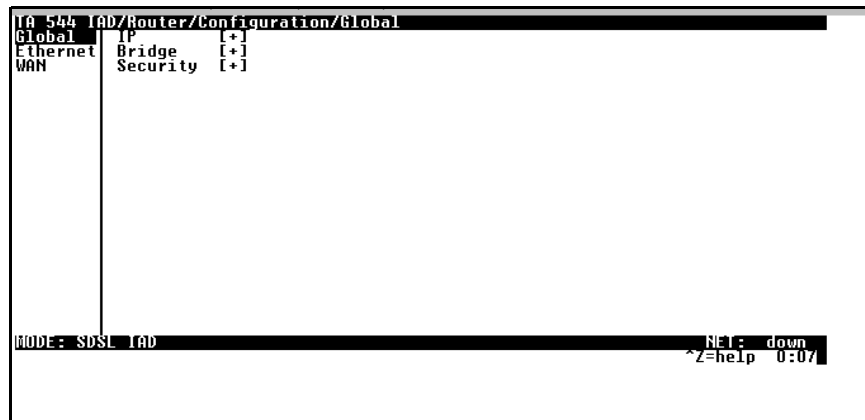


Figure 10. Global Menu

### IP

This is used for general IP configuration.

#### Mode

This item controls how the TA 544 handles IP routes. When this option is set to **ON** (def), the TA 544 will advertise and listen to routes from other IP routers. If **OFF**, the route table is still used, but only static routes are used for routing IP packets and only the Ethernet port is used. IP packets can be sent over the WAN, but only when bridged.

### Static Routes

Use this menu to enter static routes to other networks.

<b>ACTIVE</b>	Adds this static route entry to the IP routing table when set to <b>YES</b> and removes it (if it was previously added) if set to <b>No</b> (def).
<b>IP ADDRESS</b>	The IP address of the host or network address of the device being routed to.
<b>SUBNET MASK</b>	Determines the bits in the previous IP address that are used. <i>If this is to be a host route, it must be set to all ones (255.255.255.255).</i>
<b>GATEWAY</b>	The IP address of the router to receive the forwarded IP packet.
<b>HOPS</b>	The number of router hops required to get to the network or host. Maximum distance is 15 hops.
<b>PRIVATE</b>	When set to <b>No</b> , the TA 544 will advertise this static route using RIP. Setting to <b>YES</b> means that the route is kept private.

### DHCP Server

<b>DHCP MODE</b>	When set to <b>ON</b> , the TA 544 acts as a DHCP server and will dynamically assign IP, network mask, default gateway, and DNS addresses to any device which transmits a broadcast DHCP request. The addresses assigned are based on the TA 544's own IP address and will be within the same network.
<b>DHCP RENEWAL TIME</b>	The number of hours that the DHCP server should allow the device before it is required to send a new DHCP request. The default is 15 hours, and 0 represents an infinite lease.

### Domain Names

Enter the TA 544's domain name and the primary and secondary DNS servers in this menu.

<b>DOMAIN NAME</b>	Text string used to represent the domain name used by the TA 544.
<b>PRIMARY DNS</b>	First server to which domain name requests are sent.
<b>SECONDARY DNS</b>	Server used as a backup, in case the primary address does not respond to the request.
<b>PRIMARY NBNS/WINS</b>	Server to which NT domain name requests are sent.
<b>SECONDARY NBNS/WINS</b>	Server used when there is no response from the primary server.

### UDP Relay

This menu configures the TA 544 to act as a UDP relay agent for applications requiring a response from UDP hosts that are not on the same network segment as their clients.

#### Mode

When this option is set to **ON**, the TA 544 will act as a relay agent.

#### UDP Relay List

Up to four relay destination servers can be specified in this list.

<b>RELAY ADDRESS</b>	This is the IP address of the server that will receive the relay packet.
<b>UDP PORT TYPE</b>	
<b>STANDARD (def)</b>	The following standard UDP protocols are relayed when set: DHCP, TFTP, DNS, NTP (Network Time Protocol, port 123), NBNS (NetBios Name Server, port 137), NBDG (NetBIOS Datagram, port 138), and BootP.
<b>SPECIFIED</b>	When set, the UDP port (1 to 65535) can be specified in the UDP Port columns (up to three per server).
<b>UDP PORT 1, 2, 3</b>	Used for specifying UDP ports to be relayed. These fields only apply when <b>UDP PORT TYPE</b> is set to <b>SPECIFIED</b> .

### Bridge

The **BRIDGE** menu is used to set up the bridge parameters for the TA 544. The bridging function runs at the Media Access Control (MAC) level which allows any protocol packets that run over Ethernet to be forwarded. Bridging can run concurrently with IP. However, when IP routing is active, IP packets (which include ARP packets) are not bridged.

#### Mode

This is used to enable the bridge function.

#### Address Table

The TA 544 automatically maintains a table of MAC addresses detected and associates those addresses with the LAN or WAN port from which they were received.

<b>AGING</b>	The maximum time an idle MAC address remains in the table before being removed. The value is in minutes.
<b>FORWARD POLICY</b>	When this parameter is set to <b>UNKNOWN</b> (def), any bridge packet with a destination MAC address that is not in the bridge table is forwarded to all other ports. When set to <b>KNOWN</b> , the packet with the unknown destination MAC address is dropped and is not forwarded.

## Security

This menu is used to set up the authentication parameters needed to authenticate PPP connection.

### Authentication

The method used for authenticating the PPP peer is selected here. The possible values are:

<b>NONE (DEF)</b>	No attempt is made to authenticate the PPP peer.
<b>RADIUS</b>	The TA 544 will act as a RADIUS client and authenticate the PPP peer using the RADIUS server. The RADIUS server parameters must be set up properly for this to work.
<b>PPP</b>	The PPP profile is used to authenticate the PPP peer.

### Radius Server

The parameters for the RADIUS server are configured in this menu. The RADIUS server can be used for authenticating a PPP peer (if defined under **SECURITY/AUTHENTICATION**) and for Telnet server sessions.

### Primary Server

This is the IP address of the first RADIUS server that the TA 544 should attempt to communicate with when authenticating a PPP peer.

### Secondary Server

This is the IP address of the back-up RADIUS server that the TA 544 should attempt to communicate with when the primary server does not respond.

### UDP Port

This is the UDP port that the TA 544 should use when communicating with the RADIUS server. The default is 1645, which is the commonly used port.

### Secret

The RADIUS server and TA 544 share this text string. It is used by the RADIUS server to authenticate the TA 544, the RADIUS client. The factory default is not to use a secret.

### Retry Count

This is the number of times the TA 544 should send a request packet to the RADIUS server without a response before giving up. If the number of attempts to communicate with the primary server is equal to the retry count, the secondary server (if defined) is tried. If the secondary server does not respond within the retry count, the PPP peer (or Telnet session) is not authenticated and is dropped. The default is 5.

### PPP

The PPP peer can be authenticated using three standard methods: PAP (Password Authentication Protocol), CHAP (Challenge Handshake Protocol) and EAP (Extensible Authentication Protocol). The strength of the authentication is determined in the order EAP, CHAP, followed by PAP, where EAP is the strongest and PAP is the weakest. PAP is a clear-text protocol, which means it is sent over the PPP link in a readable format. Care must be taken not to allow highly sensitive passwords to become compromised using this method. CHAP and EAP use a one-way hashing algorithm which makes it virtually impossible to determine the password. EAP has other capabilities which allow more flexibility than CHAP.



The following selections are possible:

- PAP, CHAP OR EAP (DEF)** The TA 544 will ask for EAP during the first PPP LCP negotiation and allow the PPP peer to negotiate down to CHAP or PAP.
- CHAP OR EAP** The TA 544 will ask for EAP during the first PPP LCP negotiation and allow the PPP peer to negotiate down to CHAP but not PAP.
- EAP ONLY** The TA 544 will only allow EAP to be negotiated. If the PPP peer is not capable of doing EAP, then the connection will not succeed.
- PAP ONLY** The TA 544 will only allow PAP to be negotiated. If the PPP peer is not capable of doing PAP, then the connection will not succeed.

### > Ethernet

Use the **ETHERNET** menu (Figure 11) to configure the Ethernet port on the TA 544.

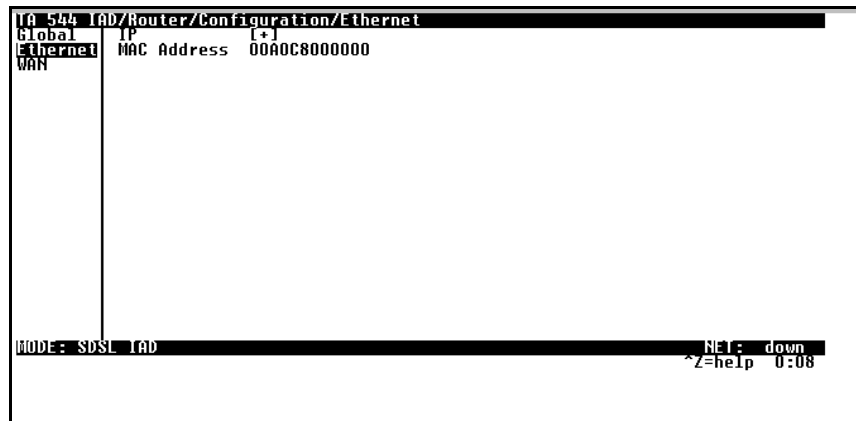


Figure 11. Ethernet Menu

### IP

This is used to setup the IP addresses for the LAN on the TA 544.

#### IP Address

The IP address assigned to the TA 544's Ethernet port is set here. This address must be unique within the network.

#### Subnet Mask

This is the IP network mask that is to be applied to the TA 544's Ethernet port.

#### Default Gateway

The default gateway is used by the TA 544 to send IP packets whose destination address is not found in the route table.

## RIP

Use this menu to enable RIP on the LAN interface.

<b>MODE</b>	Enables or disables RIP.
<b>PROTOCOL</b>	Specifies the RIP protocol. Choices are <b>V1</b> (which is RIP version 1) or <b>V2</b> (RIP version 2).
<b>METHOD</b>	Specifies the way the RIP protocol sends out its advertisements. Choices are given below.
<b>NONE</b>	All routes in the router table are advertised with no modification of the metrics.
<b>SPLIT HORIZON</b>	Only routes not learned from this circuit are advertised.
<b>POISON REVERSE (def)</b>	All routes are advertised, but the routes learned from this port are "poisoned" with an infinite metric.
<b>DIRECTION</b>	Allows the direction at which RIP advertisements are sent and listened to be specified.
<b>TX AND RX (def)</b>	RIP advertisements are periodically transmitted and are listened to on this port.
<b>TX ONLY</b>	RIP advertisements are periodically transmitted but are not listened to on this port.
<b>RX ONLY</b>	RIP advertisements are not transmitted on this port, but are listened.
<b>V2 SECRET</b>	Enter the secret used by RIP version 2 here.

## Proxy ARP

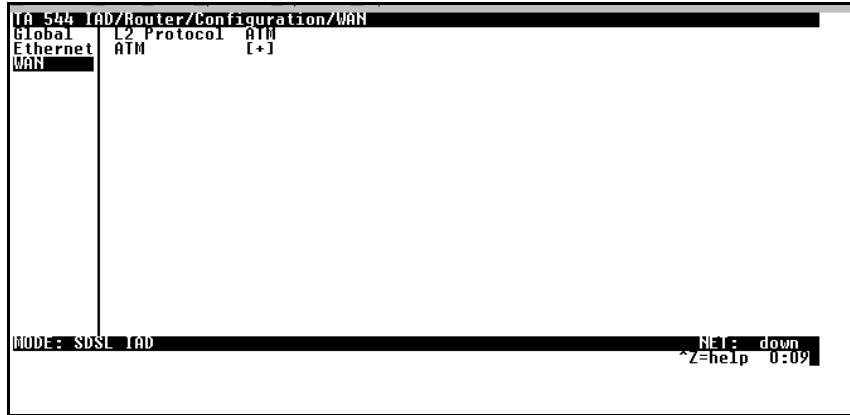
This feature allows the network portion of a group of addresses to be shared among several physical network segments. The ARP protocol provides a way for devices to create a mapping between physical addresses and logical IP addresses. Proxy ARP makes use of this mapping feature by instructing a router to answer ARP requests as a "proxy" for the IP addresses behind one of its ports. The device which sent the ARP request will then correctly assume that it can reach the requested IP address by sending packets to the physical address that was returned. This technique effectively hides the fact that a network has been (further) subnetted. If this option is set to **YES**, when an ARP request is received on the Ethernet port the address is looked up in the IP routing table. If the forwarding port is not on the Ethernet port and the route is not the default route, the TA 544 will answer the request with its own hardware address.

## MAC Address

This is a read-only MAC address programmed at ADTRAN.

> **WAN**

Use the **WAN** menu (Figure 12) to configure WAN settings on the TA 544.



**Figure 12. WAN Menu**

**L2 Protocol**

Displays the current L2 protocol -ATM (read only).

**ATM**

Use the ATM menu to setup Data PVCs for the router.

**Description**

This is the text description for the PVC.

**VPI**

ATM virtual port identifier.

**VCI**

This is the ATM virtual channel identifier.

**PCR**

Peak Cell Rate. Enter the maximum bandwidth in cells per second.

**QOS**

Quality of Service. UBR = Low priority data.

**Protocol**

This is the protocol supported on the PVC.

**RFC1483 IP**

Use this selection to support IP on this DLCI.

**Active**

This selection enables IP on this PVC.

**Far - End IP Address**

This is the address of the NEXT hop router on this interface.

**IP netmask**

This is the network mask used for this interface.

**Local IP Address**

This is the IP address for this PVC.

**NAT**

Use this menu to set up and use Network Address Translation on this interface.

<b>NETWORK ADDRESS PORT TRANSLATION</b>	By enabling port translation, IP packets are modified as they pass through this interface. During transmission, private addresses are translated into a single public (NAPT) IP address. Incoming packets are translated from the public to private address based on the protocol port numbers. Once enabled, you must set up NAT for use.
---	--

**RIP**

Use this menu to enable RIP on the WAN interface. (See *RIP* on page 34 for description of options.)

**RFC 1483 Bridge**

This is used to enable bridge mode on this PVC.

**PPPoATM**

This is used to enable bridge mode on this PVC.

**Authentication**

The authentication menu contains the required parameters for the authentication of the PPP peer and for being authenticated by the PPP peer. Authentication is applied between the TA 544 and the PPP peer as follows:

<b>TX METHOD</b>	This parameter specifies how the TA 544 is to be authenticated by the PPP peer. There are four possible selections. See <i>PPP</i> on page 32 for descriptions of these selections.
<b>TX USERNAME</b>	This is the username that is used when being authenticated by the PPP peer.
<b>TX PASSWORD</b>	This is the password or secret that is used when being authenticated by the PPP peer.
<b>RX USERNAME</b>	This is the username used to match the user to the Connection List profile. During an incoming call, the TA 544 will scan all active connection profiles and match the received PPP peer's username. If the name is not found, then the default profile is used, if and only if the default profile has nothing in the Rx Username parameter. During and outgoing call, this username does not have to match the username reported by the PPP peer.
<b>RX PASSWORD</b>	This is the password or secret that is used to authenticate the PPP peer.

## **IP**

Use this menu to configure IP settings.

<b>MODE</b>	Setting to <b>ON</b> (def) will permit this connection profile to negotiate PPP IPCP with the PPP peer for exchanging of IP packets.
<b>LOCAL IP</b>	This network mask is applied to the IP/NET address for determining the PPP peer's network. If left as 0.0.0.0, a standard network mask is used.
<b>NETMASK</b>	This network mask is applied to the IP/NET address for determining the PPP peer's network. If left as 0.0.0.0, a standard network mask is used.
<b>REMOTE IP</b>	This network mask is applied to the IP/NET address for determining the PPP peer's network. If left as 0.0.0.0, a standard network mask is used.
<b>NAT</b>	The TA 544 can perform network address translation. This feature is most widely used when connecting to the Internet. The Ethernet network can consist of private network numbers. When this profile is connected, all IP addresses on the Ethernet side are translated into the one real IP address negotiated with the PPP peer (ISP). Multiple stations on the Ethernet side can access the Internet simultaneously. Setting this option to <b>ON</b> will cause the TA 544 to perform NAT. In the <b>OFF</b> position (def), the unit will route across the connection normally.
<b>ROUTE</b>	The IP parameters are configured in this menu. Adjusting these parameters is only necessary for certain dial-on-demand applications. Usually, the TA 544 will discover the PPP peer's network automatically using PPP IPCP and/or RIP.
<b>RIP</b>	Use this menu to enable RIP on the WAN interface.
<b>MODE</b>	Enables or disables RIP.
<b>PROTOCOL</b>	Specifies the RIP protocol. Choices are <b>V1</b> (which is RIP version 1) or <b>V2</b> (RIP version 2).
<b>METHOD</b>	Specifies the way the RIP protocol sends out its advertisements. Choices are given below.
<b>NONE</b>	All routes in the router table are advertised with no modification of the metrics.
<b>SPLIT HORIZON</b>	Only routes not learned from this circuit are advertised.
<b>POISON REVERSE (def)</b>	All routes are advertised, but the routes learned from this port are "poisoned" with an infinite metric.

<b>DIRECTION</b>	Allows the direction at which RIP advertisements are sent and listened to be specified.
<b>TX AND RX (def)</b>	RIP advertisements are periodically transmitted and are listened to on this port.
<b>TX ONLY</b>	RIP advertisements are periodically transmitted but are not listened to on this port.
<b>RX ONLY</b>	RIP advertisements are not transmitted on this port, but are listened.
<b>TRIGGERED</b>	When set to <b>YES</b> , only IP RIP updates are sent when the routing table has changed and learned routes not “aged.” When set to No (def), updates are sent periodically.
<b>RETAIN</b>	When this Connection List entry is disconnected and this parameter is set to <b>YES</b> , all routes learned from this WAN connection are retained and their routing interface is set to idle. This permits dial-on-demand to occur using this profile for any IP network that might have been advertised by the particular PPP peer. The idle routes can be flushed or “zombied” from the routing table if a manual hangup is performed when this WAN connection is not active. When this Connection List entry is disconnected and this parameter is set to <b>NO</b> (def), routes learned from this session are “zombied” and are not retained.

### **PPP**

Use this menu to configure PPP settings.

<b>VJ COMPRESSION</b>	When this item is set to <b>ON</b> , the TA 544 will perform TCP/IP header compression known as Van Jacobson compression to the PPP peer. Normally, this is not necessary over ISDN connections and can be set to Off (def) to disable it.
<b>MAX CONFIGURE</b>	This value is the number of unanswered configuration-requests that should be transmitted before giving up on a call. The possible values are 5, 10 (def), 15 and 20.
<b>MAX TIMER</b>	This value is the number of seconds to wait between unanswered configuration-requests. The possible values are 1 sec, 2 secs (def), 3 secs, 5 secs and 10 secs.

- MAX FAILURE** Due to the nature of PPP, configuration options may not be agreed upon between two PPP peers. This value is the number of configuration-naks that should occur before an option is configuration-rejected. This allows a connection to succeed that might otherwise fail. The possible values are 5 (def), 10, 15 and 20.
- PPP ENCAPSULATION** Select either **LLC** mode or **VC-Mux** mode.

**Filters**

The TA 544 can block packets in and out of a WAN port by use of the filters. They are set up on a per-Connection List profile basis. They are set up in two steps: (1) define the types of packets that would be of interest, and (2) set up the filter type and combination of defines that will cause a packet block.

- WAN-TO-LAN (IN)** The packets which come into the TA 544 can be filtered in three ways:
- DISABLED (DEF)** Turns off packet input filtering. No incoming packets are blocked.
  - BLOCK ALL** All incoming packets from the WAN are blocked except as defined in the **FILTERS/IN EXCEPTIONS** list.
  - FORWARD ALL** All incoming packets from the WAN are not blocked except as defined in the **FILTERS/IN EXCEPTIONS** list.
- IN EXCEPTIONS** This is a list of up to 32 entries which can be combined using the operations field. The operations are performed in the order they appear on the list.
- ACTIVE** Turns this entry active when set to **On**.
  - TYPE** Selects the filter define list to reference:
    - MAC**
    - PATTERN**
    - IP**
    - IPX**
  - FILTER LIST NAME** Selects between filters defined in the list.
  - NEXT OPER** The next operation to use to combine with the next filter in the list.
    - END** the last filter to combination.
    - AND** logically AND this filter with the next filter in the list.
    - OR** logically OR this filter with the next filter in the list.

<b>LAN-TO-WAN (OUT)</b>	The packets which come out toward the WAN from the TA 544 can be filtered in three ways:
<b>DISABLED (DEF)</b>	Turns off packet output filtering. No outgoing packets are blocked.
<b>BLOCK ALL</b>	All outgoing packets to the WAN are blocked except as defined in the <b>FILTERS/OUT EXCEPTIONS</b> list.
<b>FORWARD ALL</b>	All outgoing packets to the WAN are not blocked except as defined in the <b>FILTERS/OUT EXCEPTIONS</b> list.
<b>OUT EXCEPTIONS</b>	This is a list of up to 32 entries. The setup is exactly the same as the <b>FILTERS/OUT EXCEPTIONS</b> list.

### Configuring the Router – Status

Use the **ROUTER/STATUS** menu to view and set the parameters shown in Figure 13. The **ROUTER/STATUS** screens give the user useful information for debugging the current routes in the TA 544.

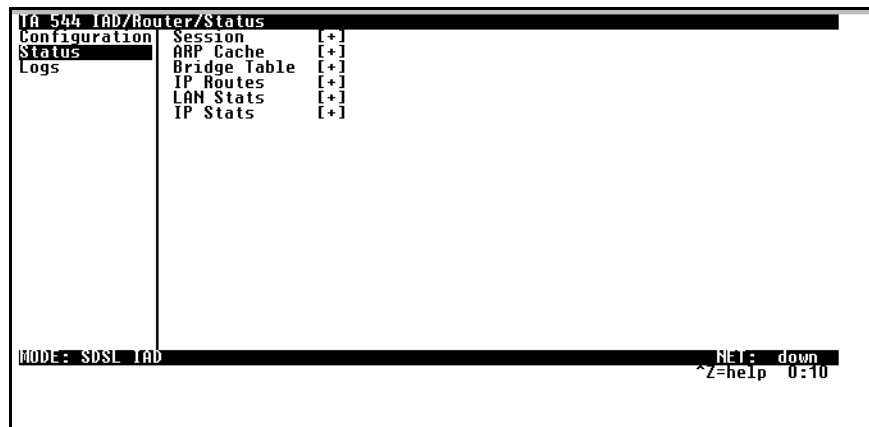


Figure 13. Router/Status Menu

#### > **Session**

This menu maintains statistics about the active ATM PVCs.

#### > **ARP cache**

This is a listing of the currently connected Ethernet port on the LAN.

#### > **Bridge Table**

This shows the detected MAC addresses and the interface to which they are associated.

#### > **IP Routes**

This shows the current routes in the TA 544 and their use.



**> LAN Stats**

This shows traffic over the LAN interface.

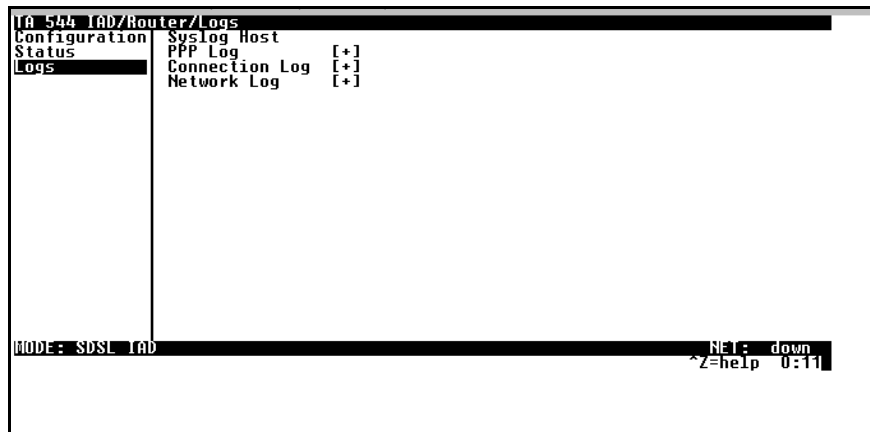
**> IP Stats**

This shows IP traffic through the TA 544.

**Configuring the Router – Logs**

The **ROUTER/LOGS** menu (Figure 14) contains logs displaying important information about the running condition of the TA 544. The logs can be set to capture diagnostics of error conditions only by way of a log level. The levels are divided up as follows:

- level 0 - Fatal event (causes reset)
- level 1 - Critical event
- level 2 - Error event
- level 3 - Warning event
- level 4 - Notify event
- level 5 - Informational event
- level 6 - Debugging event



**Figure 14. Router/Logs Menu**

**> Sys log Host**

Set this to the IP address or domain name (if DNS configured) of the syslog host device. All log events are sent to this device.

**> PPP Log**

Information pertaining to the PPP negotiation and authentication is logged in the PPP log.

**> Connection Log**

Information pertaining to the call placement and answering is logged in the Connection log.

## > **Network Log**

Information pertaining to routing protocols is placed in this log.

Each log (PPP log, Connection log, and Network log) contains the following elements.

### **Active**

When set to **YES** (def), PPP events below or equal the log level are logged into the log.

### **Wrap**

When set to **YES** (def), new PPP events will overwrite old PPP events when the log is full. All logging will stop when the log is full and set to **NO**.

### **Level**

In order to log events, they must be at or below this level. Range is 0 to 6. The default is 3.

### **View**

This menu displays the log list. The fields are as follows:

<b>DATE/TIME</b>	Date and time event occurred.
<b>LEVEL</b>	Level associated with this event (0-6).
<b>MESSAGE</b>	Text message for this event. If message is too long to fit on the line, another event appears below it continuing the message.

### **Clear**

This clears the log when activated.

## Configuring Voice Support – Config

Use the **VOICE/CONFIG** menu to view and set the parameters shown in Figure 15.

```
TA 544  TA0/Voice/Config
Config  Call Control  Jetstream
Status  VPI              0
        VCI              39

MODE: SOSL  TAB          NE1: down
                ^Z=help  0:12
```

Figure 15. Voice/Config Menu

### > **Call Control**

The **CALL CONTROL** setting is used to configure the correct Voice Gateway protocol for voice signaling control between the TA 544 and the configured Gateway. The **CALL CONTROL** setting must be configured correctly before the voice circuits will work correctly. The TA 544 supports Jetstream, Tollbridge, and CopperCom Voice Gateways.

### > **VPI**

The **VPI** setting is used to configure the TA 544 virtual path setting used to communicate with the configured Voice Gateway.

### > **VCI**

The **VCI** setting is used to configure the TA 544 virtual circuit setting used to communicate with the configured Voice Gateway.

## Configuring Voice Support – Status

Use the **VOICE/STATUS** menu to view and set the parameters shown in Figure 16.

```
TA 544 IAD/Voice/Status
Config Gateway Stats [+]
Status PVC Stats      [+]
        POTS Stats    [+]
        Clear Stats   <+>

MODE: SDSL IAD                               NE1: down
                                           ^Z=help  0:13
```

Figure 16. Voice/Status Menu

### > Gateway Stats

The **GATEWAY STATS** menu shows the current state of the communication link between the TA 544 and the Voice Gateway. The Gateway Link is indicated as **UP** or **DOWN**. A count of management messages is indicated along with the number of active calls in progress.

### > PVC Stats

The **PVC STATS** menu shows the current state of the virtual circuit used between the Voice Gateway and the TA 544 IAD for voice signaling and voice payload delivery.

### > Voice Stats

The **POTS STATS** menu shows real-time indication status of each voice port on the TA 544. From this menu, on a per port basis, the user can determine which ports are active/inactive. Several statistics at this menu are used only for internal ADTRAN development. Task, Inserts, and Drops indicators are for internal use only.

### > Clear Stats

The **CLEAR STATS** menu can be used to clear the counters used for **VOICE/STATUS** menus.

## Managing the Modules – Modules

Use the **MODULES** menu to view and set the parameters shown in Figure 17.

Sit	Type	Menu	Alarm	Test	Status
0	NET (SDSL)	[n/a]	[n/a]	[n/a]	[n/a]
1	EMPTY	[+]	[n/a]	[+]	[+]
2	EC	[+]	-	-	-

MODE: SDSL TAD      NET: down  
Access module menus      ^Z=help 0:14

Figure 17. Modules Menu

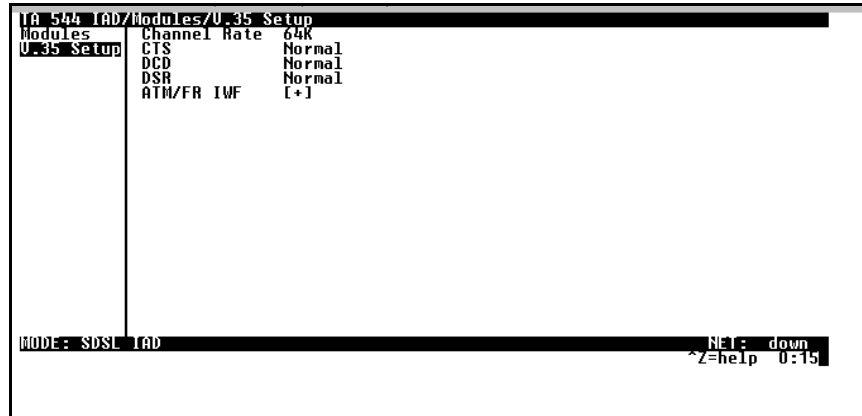
### > Modules Table

The TA 544 contains three fixed modules: The WAN/Network interface, Echo Canceller module, and the V.35 interface. The **MODULES** table allows management of the on-board modules in the TA 544.

The table contains **MENU**, **ALARM**, **TEST**, and **STATUS** indicators/menus customized for each module.

## Managing the Modules – V.35 Setup

Use the **V.35 SETUP** menu to view and set the parameters shown in Figure 18.



```
TA 544 1AD/Modules/V.35 Setup
Modules
V.35 Setup
Channel Rate 64K
CTS Normal
DCD Normal
DSR Normal
ATM/FR IWF [+]
MODE: SDSE 1AD NET: down
^Z=help U:15
```

Figure 18. V.35 Setup Menu

**CHANNEL RATE** and **EIA** settings are supported via this menu option. For all typical applications, these settings are left in their default states.

### > **ATM/FR IWF**

This menu contains the setup and status for the ATM/Frame Relay interworking functions.

#### **Mode**

The **MODE** setting configures the V.35 port for FRF5 or FRF8 operation, depending upon the application being supported.

#### **FRF5**

This is also known as Network Interworking. Use this mode for Frame Relay over ATM.

#### **FRF8**

This is also known as Service Interworking. In this mode, the TA 544 performs a translation between Frame Relay and ATM protocols.

#### **Configuration**

The **CONFIGURATION** menu is used to support the configuration of Frame-to-ATM interworking, signaling formats, timeout values, and PVC settings.

The following settings are used for FRF5.

<b>LAN FR MAINT PROTOCOL</b>	Frame Relay maintenance or signaling protocol between local V.35 port and the attached DTE port, support ANSI Annex A, CCITT Q933 Annex D, CISCO LMI or Static (no signaling).
<b>LAN FR POLL TIMEOUT T392 (5-30)</b>	T392 for signaling protocol, typical value 15. No meaning if Maint Protocol is Static.
<b>FRN PORT CONFIG</b>	Logical Frame Relay ports over ATM. Up to 4 ports are supported with each port supporting up to 4 DLCI mappings. Go to <b>NUM</b> field. Typing "i" or "I" will insert another entry, and typing "d" or "D" will delete one entry.
<b>NAME</b>	To identify your port.
<b>ATM VPI</b>	Specifies the virtual path over which this logical port is running.
<b>ATM VCI</b>	Specifies the virtual circuit over which this logical port is running.
<b>DE MAP</b>	Frame Relay to ATM DE mapping; default value ( <b>FRN ONLY, ATM 0</b> ) suggested.
<b>CLPI MAP</b>	ATM to Frame Relay CLPI map; default value ( <b>FRN ONLY</b> ) suggested.
<b>D/C</b>	Set D/C field in the header to 0 or 1.
<b>HEADER</b>	Header format; only 2 bytes supported now.
<b>MAINT PROTOCOL</b>	Maintenance or signaling protocol over this logical Frame Relay port. Support Annex A, Annex D, CISCO LMI or Static.
<b>MUX MODE</b>	Many DLCIs or one DLCI mapping over this port.
<b>DLCI MAP</b>	Actual DLCI mappings.
<b>LAN DLCI</b>	The DLCI configured over local V.35 Frame Relay port.
<b>NET DLCI</b>	The DLCI configured over the WAN side logical Frame Relay port.
<b>ACTIVE</b>	Always active, not configurable.

The following settings are used for FRF8.

<b>LAN FR MAINT PROTOCOL</b>	Frame Relay maintenance or signaling protocol between local V.35 port and the attached DTE port, support ANSI Annex A, CCITT Q933 Annex D, CISCO LMI or Static (no signaling).
<b>LAN FR POLL TIMEOUT T392 (5-30)</b>	T392 for signaling protocol, typical value 15. No meaning if Maint Protocol is Static.
<b>FR/ATM PVC MAPPING</b>	Up to 4 mappings are supported.
<b>FR DLCI</b>	Frame Relay DLCI on V.35 port.
<b>ATM VPI</b>	Specifies the virtual path to which DLCI is mapped.
<b>ATM VCI</b>	Specifies the virtual circuit to which DLCI is mapped.
<b>TRANSLATE</b>	Translate or transparent mode between Frame Relay frames and ATM cells.
<b>DE MAP</b>	Map Frame Relay DE bit to ATM CLPI bit, Always 0, Always 1 or Convert each other.
<b>FECN MAP</b>	Map Frame Relay FECN bit to ATM EFCI bit, Always 0, Always 1 or Convert each other.



## Appendix A. Specifications and Features

### Network Interface

#### SDSL: (2B1Q Conexant Based)

- Line Rate: 160 kbps to 2.3 Mbps
- Physical Interface: RJ-48C
- Training: Conexant Autobaud Capable
- Echo Cancellation

#### G.shdsl: (ITU G.991.2 Compliant)

- Line Rate: 192 kbps to 2.3 Mbps
- Physical Interface: RJ-48C
- Rate Adaptive
- Improved Spectral Compatibility
- Echo Cancellation

### ATM Support

- 6 PVCs (1 Voice, 5 Data)
- IP over ATM (RFC 1483)
- RFC 1483 (Multiprotocol Encapsulation over ATM), PPPoA (RFC 2364)
- Full Traffic Shaping and QoS Support
- VBR-rt and UBR Support
- F5 OAM Loopback Capability

### ISDN Interfaces

- 4 S0 Ports
- Physical RJ-45 Interfaces
- Line: 4-wire (Tx and Rx Pair)
- Operating Mode: Full-duplex
- Data Rate: 2B+D ISDN (B=64kbps, D=16kbps); 128 kbps available
- PS1 and PS2 Powering to power ISDN phone

### Routing Capability

- Ethernet 10/100BaseT (RJ-45)
- IEEE 802.3 and 802.1D (MAC Bridging)
- IP Support: TCP, RIP V1, RIP V2, UDP,
- ICMP, ARP, UDP Relay, SYSLOG
- PPP Support: LCP, IPCP, BCP, IPXCP
- DHCP Server to LAN
- DHCP from network (NAT)

### **Security Features**

- PAP, CHAP, EAP, and Radius
- NAT: Many to One and Many to Many
- PAT with DHCP
- Full Filtering: Pattern, IP, IPX, and Bridge
- Full Password Protection

### **Management Options**

#### **Craft Interface**

- Local and Remote Management
- Electrical EIA-232, Physical dB9
- Full, menu driven Interface
- Software download via TFTP

#### **10/100 BaseT Port**

- Local and Remote Management
- SNMP V1 support
- Full, menu driven TELNET access

### **Serial Data**

- Data Rate: Nx56 or Nx64 kbps (N=1 to 24)
- Electrical and Mechanical: CCITT V.35
- Frame Relay (FRF.5 and FRF.8)
- Optional X.21/V.11 Adapter Available

### **Environment**

#### **Temperature:**

- Operating: 0 to 50 deg C (32 to 113 deg F)
- Storage: -20 to 70 deg C (-4 to 158 deg F)
- Relative humidity: Up to 95%, noncondensing

### **Physical**

- Dimensions: 3.81cm H x 15.88cm D x 22.86cm W
- Weight: 0.91 kg
- Agency Approvals: EN55022, EN50082-1, EN60950, CE Mark, ETSI 300-386-2

### **Power**

- Auto ranging AC power supply with IEC connector: 100 to 250 VAC, 50 to 60 Hz, 300 to 160 mA
- Battery Backup, will power one phone for up to 8 hours

## Appendix B. Updating TA 544 Firmware using XMODEM

The TA 544 supports firmware updating using XMODEM transfer protocol via the base unit's **CRAFT** port. XMODEM is found in the VT 100 terminal emulation application in the ADTRAN Utilities package and in most PC VT 100 communications software packages.



*Make certain that the communications software package being used has flow control turned off.*

Before beginning this procedure, you must obtain the appropriate update file from ADTRAN Technical Support at **(888) 4ADTRAN (423-8726)** or call **(256) 963-8000** and ask for Technical Support.

An XMODEM download can be initiated by enabling a forced download or by using the console menus. The following materials are required.

- VT 100 terminal or PC with VT 100 terminal emulation software
- XMODEM software

### **Updating Firmware via a Forced Download**

#### **Perform the Steps Below in the Order Listed**

- 1. Using a VT 100 terminal emulation communication software package which contains XMODEM protocol support, log in to TA 544. Set the transmit rate of the emulation software to 9600 baud.**
- 2. Unplug the unit to remove power. When power is reapplied, hold down the letter 'B' from the VT 100 terminal. Before the unit begins its boot-up sequence it will check for the letter 'B'. If present, the download menu will appear.**



*Both uppercase and lowercase letters will work for the Forced Download. Make certain flow control is disabled for the VT 100 interface.*

- 3. Press Enter until a menu appears.**



*To shorten transmit time, select the option from the menu to change the transmit rate to 115.2 baud or the highest rate supported by the terminal emulation software. If this transmit rate is changed, change emulation software properties to match this rate and disconnect and connect again. Press **Enter** again until the menu appears.*

4. Choose option 1, **BEGIN XMODEM DOWNLOAD NOW**, from the menu to start the XMODEM file download.
5. Press **Y** at the **START FLASH DOWNLOAD NOW** prompt to continue with the XMODEM file transfer.



When TA 544 is ready to receive the XMODEM upload, the menu screen will display **Transmit Flash . . . download file now**. If this does not appear, please review the steps above for possible configuration errors.

6. From the terminal emulation software, begin the XMODEM upload by using the appropriate command sequence. (If necessary, refer to terminal emulation software documentation for help. Also, when specifying the filename, ensure that the file transferred is the one provided by ADTRAN. Otherwise, the update will not complete successfully.)



Because XMODEM data is being transferred in-band through the menu interface, the VT 100 menus of TA 544 will be inoperable from the **CRAFT** port.

7. When the update has successfully completed, **TRANSFER COMPLETE** appears in the terminal window. If an error occurs during the update, an error message will display in the terminal window. If this occurs, return to Step 3 and attempt the update again. If the same error occurs, contact ADTRAN Technical Support.
8. After the **TRANSFER COMPLETE** message has been displayed, cycle power on the unit.
9. Change the emulation software properties to 9600 baud. Disconnect and connect to the unit at this transmit rate and continue configuring the unit as normal.



It is suggested that a factory default be conducted after the unit is updated with new firmware.

### **Updating Firmware via the Console Menus**

1. Using a VT 100 terminal emulation communication software package which contains XMODEM protocol support, log in to TA 544.
2. Select **SYSTEM UTILITY/UPDATE FIRMWARE**.

3. **Select XMODEM for TRANSFER METHOD.**
4. **Press Enter on START TRANSFER <+>.**
5. **When prompted, press Y to erase flash.**



*When TA 544 is ready to receive the XMODEM upload, the menu screen will clear and display **Transmit Flash . . . download file now**. If this does not appear, please review the steps above for possible configuration errors.*

6. **From the terminal emulation software, begin the XMODEM upload by using the appropriate command sequence. (If necessary, refer to terminal emulation software documentation for help. Also, when specifying the filename, ensure that the file transferred is the one provided by ADTRAN. Otherwise, the update will not complete successfully.)**



*Because XMODEM data is being transferred in-band through the menu interface, the VT 100 menus of TA 544 will be inoperable from the **CRAFT** port.*

7. **When the update has successfully completed, TRANSFER COMPLETE displays in TRANSFER STATUS. The module restarts immediately and resumes operation. If an error occurs during the update, an error message will display in the TRANSFER STATUS field. If this occurs, return to Step 3 and attempt the update again. If the same error occurs, contact ADTRAN Technical Support.**

## **Appendix C. Updating TA 544 Firmware using TFTP**

TA 544 supports firmware updates via the IP network using TFTP from a network server. The network server must be capable of supporting TFTP server requests from the TFTP client within the TA 544.

You must have a level 2 password to perform updates to the TA 544. Please consult the TA 544 administrator if this password is not known.

You must obtain the appropriate update file from ADTRAN Technical Support at **(888) 4ADTRAN (423-8726)** or call **(256) 963-8000** and ask for Technical Support.

You must copy the update file provided by ADTRAN to a network server that supports TFTP server requests. Record both the IP address of the server and the full path location of the update file to be downloaded.

The following materials are required:

- A PC with a Telnet client software
- A TFTP Server accessible on the local network (a TFTP Server is provided as part of the ADTRAN Utilities software)

---

**Perform Steps Below in the Order Listed**

---

1. **Using a Telnet program, log in to TA 544.**
2. **Select SYSTEM UTILITY / UPDATE FIRMWARE.**
3. **Select TFTP for TRANSFER METHOD.**
4. **Enter into TFTP SERVER IP ADDRESS the IP address of the network server that was recorded earlier.**
5. **Enter into TFTP SERVER FILENAME the full path name and filename of the update file that was recorded earlier.**
6. **Select START TRANSFER <+> to start the update process. Enter Y to confirm the transfer and to set up the module to receive the TFTP upload.**



*During the TFTP upload process, various status messages display in **CURRENT UPDATE STATUS** to indicate progress. The table below describes these messages.*

When the update has successfully completed, **TRANSFER COMPLETE** displays in **TRANSFER STATUS**. The TA 544 restarts immediately and resumes operation.

If an error occurs during the update, an error message will display in the **TRANSFER STATUS** field. If this occurs, return to Step 3 and attempt the update again. If the same error occurs, contact ADTRAN Technical Support.

During the TFTP upload, various status messages display to indicate progress. The following table describes these messages.

<b>Message</b>	<b>Meaning</b>
Contacting Server	Indicates communication with the TFTP network server is trying to be established with the specified server address in the <b>TFTP SERVER IP ADDRESS</b> field.
Beginning TFTP Transfer	Indicates communication with the TFTP network server has been established and the update file is being transferred between TA 544 and the TFTP network server.
Completed	Indicates the TA 544 product successfully received the update file.

<b>Message</b>	<b>Meaning</b>
Error: File Not Found	Indicates the TFTP network server was unable to locate the specified file name or path in the TFTP Server File-name field.
Error: Access Violation	Indicates the TFTP network server denied TA 544 access to the given update file name and path. Please verify appropriate user rights are selected for the specified path.
Error: Illegal Operation	An unknown operation was detected by TA 544 when transferring the update file from the TFTP network server.
Error: User Aborted	Indicates the user selected <b>CANCEL UPDATE</b> to abort reception of the update file from the TFTP network server.



## Appendix D. Navigating the Terminal Menus

### Terminal Menu Window

The TA 544 uses a multilevel menu structure that contains both menu items and data fields. All menu items and data fields display in the terminal menu window, through which you have complete control of the TA 544 (see Figure 19).

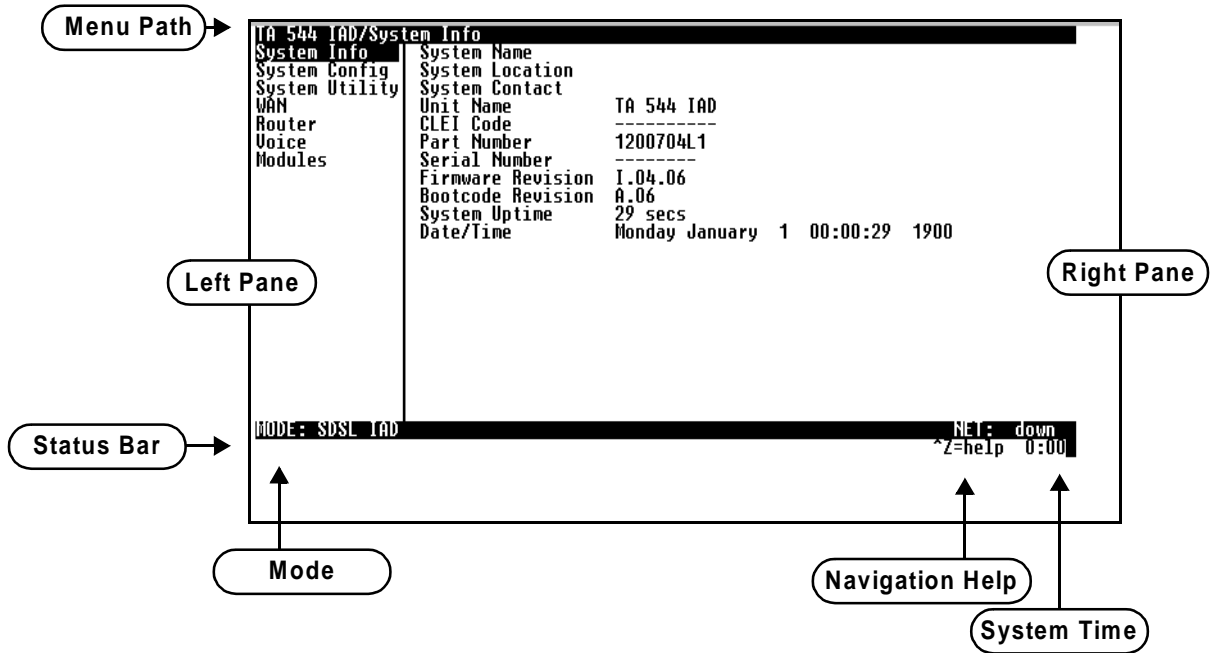


Figure 19. Top-level Terminal Menu Window

### Menu Path

The first line of the terminal menu window (the menu path) shows the session's current position (path) in the menu structure. For example, Figure 19 shows the top-level menu with the cursor on the **SYSTEM INFO** submenu; therefore, the menu path reads **TA 544 IAD/SYSTEM INFO**.

**NOTE** *The top level menu will always display the specific product name from the TA 544 family.*



**CTRL-W** must be invoked to save configuration changes to non-volatile memory.

## Window Panes

When you first start a terminal menu session, the terminal menu window is divided into left and right panes. The left pane shows the list of available submenus, while the right pane shows the contents of the currently selected submenu.

### Window Pane Navigation

Use the following chart to assist you in moving between and within the two window panes.

To move...	Press one of these keys...
From left pane to right pane	<b>Tab</b> <b>Enter</b> <b>Right arrow</b>
From right pane to left pane	<b>Tab</b> <b>Escape</b> <b>Left arrow</b>
Within each pane	<b>Up arrow</b> <b>Down arrow</b> <b>Left arrow</b> <b>Right arrow</b>

### Right Window Pane Notation

The right window pane shows the contents of the currently selected menu. These contents can include both submenu items and data fields. Some submenus contain additional submenus and some data fields contain additional data fields. The following chart explains the notation used to identify these additional items.

This notation...	Means that...
[+]	More items are available when selected.
[DATA]	More items are available when selected.
<+>	An action is to be taken, such as activating a test.
Highlighted menu item	You can enter data in this field.
Underlined field	The field contains read-only information.

### ***Additional Terminal Menu Window Features***

<b>Mode</b>	Describes the mode of the TA 544 base unit (system).
<b>Port Status</b>	Indicates the types of modules installed in ports 1—6.
<b>Navigation Help</b>	Lists characters used for navigating the terminal menu ( <b>Ctrl-Z</b> ). See also <i>Moving through the Menus</i> below.
<b>System Time</b>	Displays current time. See <i>Date/Time</i> on page 17 for details on editing the time.

### **Navigating Using the Keyboard Keys**

You can use various keystrokes to move through the terminal menus, to manage a terminal menu session, and to configure the system. Press **Ctrl-Z** to activate a pop-up screen listing the navigation keystrokes.

### ***Moving through the Menus***

<b>To do this...</b>	<b>Press this key...</b>
Return to the home screen.	<b>H</b>
Jump between two menu items.  Press <b>J</b> while the cursor is located on a menu item, and you jump back to the main screen.  Go to another menu item, press <b>J</b> , and you jump back to the screen that was displayed the first time you pressed <b>J</b> .  Press <b>J</b> when you want to jump between these items.	<b>J</b>
Select items.	<b>Arrows</b>
Edit a selected menu item.	<b>Enter</b>
Cancel an edit.	<b>Escape</b>
Close pop-up help screens.	<b>Escape</b>
Move between the left and right panes.	<b>Tab or Arrows</b>
Move to the top of a screen.	<b>A</b>
Move to the bottom of a screen.	<b>Z</b>
Ascend one menu level.	<b>Backspace</b>

### Session Management Keystrokes

To do this...	Press this...
Log out of a session.	<b>Ctrl-L</b>
Invalidate the password entry and return to the login screen.	<b>Ctrl-S</b>
Refresh the screen.  To save time, only the portion of the screen that has changed is refreshed. This option should be necessary only if the display picks up incorrect characters.	<b>Ctrl-R</b>

### Configuration Keystrokes

To do this...	Press this key...
Restore factory default settings.  This setting restores the factory defaults based on the location of the cursor. If the cursor is on a module line (in the <b>MODULES</b> menu), then only the selected module is updated to factory defaults.	<b>F</b>
<b>Copy selected items to the clipboard.</b>  The amount of information you can copy depends on the cursor location when you press <b>C</b> : <ul style="list-style-type: none"> <li>• If the cursor is over an editable field, only that item is copied.</li> <li>• If the cursor is over the index number of a list, then all of the items in the row of the list are copied. For example, if the cursor is over the <b>SLOT #</b> field in the <b>MODULES</b> screen, all of the information associated with the slot is copied.</li> </ul>	<b>C</b>
Paste the item stored in the clipboard, if the information is compatible.  You must confirm all pastes—except those to a single editable field.	<b>P</b>
Increment the value of certain types of fields by one when you paste information into those fields.	<b>&gt;</b>
Decrement the value of certain types of fields by one when you paste information into those fields.	<b>&lt;</b>
<b>Insert a new list item.</b>  For example, add a new item to the <b>DLCI MAPPING</b> by pressing <b>I</b> while the cursor is over an index number.	<b>I</b>
<b>Delete a list item.</b>  For example, delete an item from the <b>DLCI MAPPING</b> by pressing <b>D</b> while the cursor is over the index number.	<b>D</b>

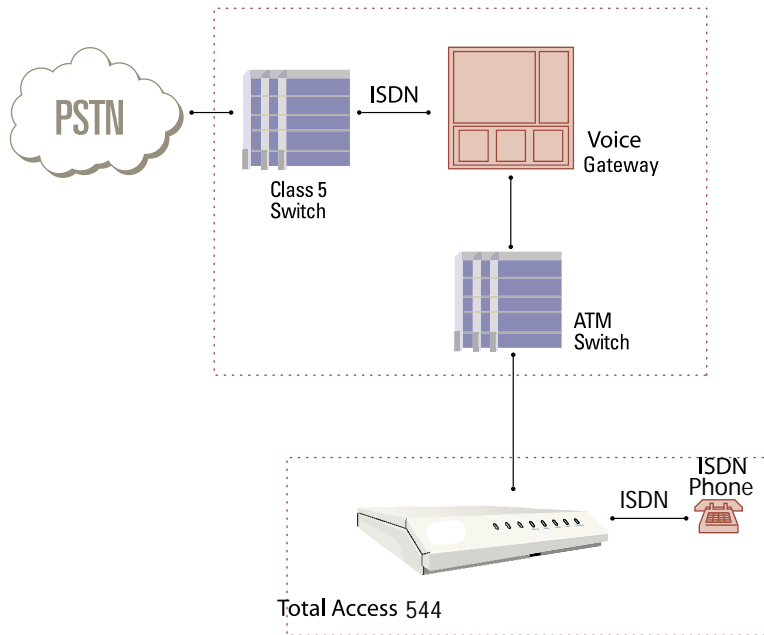
## ***Getting Help***

The bottom line of the terminal menu window contains context-sensitive help information. When the cursor is positioned over a set of configuration items, a help message displays (when available) providing a description of the item. When more detailed help is available for a particular item, **^A** displays at the bottom of the window. At this point, if you press **Ctrl-A**, a pop-up help screen displays with information about the item.

Press **Ctrl-Z** to activate the help screen that displays the available keystrokes you can use to navigate the terminal menus.

## Appendix E. Voice Gateway Quick Start Procedure (Voice Turn up)

A typical VoATM application (see Figure 20) uses a TA 544 connected to an ATM network. For voice applications, a Voice Gateway is needed to interface with the PSTN. TdSoft and Jetstream are popular Gateway types.



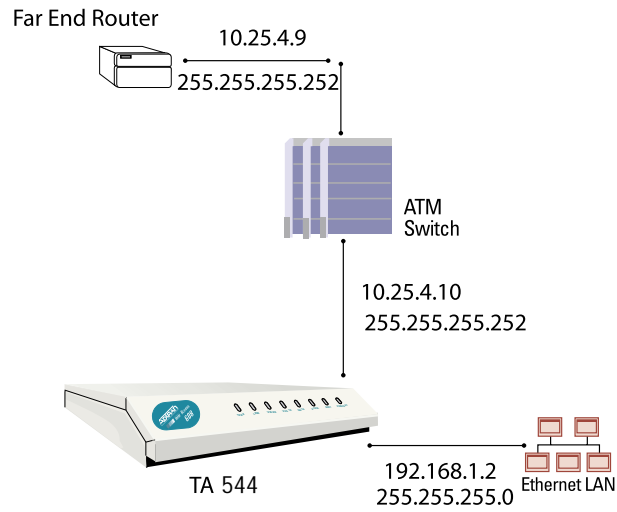
**Figure 20. Application Diagram**

To configure a TA 544 for use with the Voice Gateway, you need to know the VPI and VCI to be used on the ATM network. You also need to know the format for Idle Cells and whether Data Scrambling is used on this ATM network. The following procedure will help you navigate the TA 544 menus for configuring the necessary elements for VoATM with the Voice Gateway.

<b>Voice Turn Up</b>	
<b>Step</b>	<b>Action</b>
<b>1</b>	From the TA 544 main menu, select the <b>WAN</b> menu. (Here you set up the ATM network.)
<b>2</b>	Select the <b>ATM CONFIG</b> menu.
<b>3</b>	Enter the <b>IDLE CELLS</b> format for your network.
<b>4</b>	Set <b>DATA SCRAMBLING</b> appropriately for your network.
<b>5</b>	Back all the way out to the top level TA 544 menu, and then select the <b>VOICE</b> menu. (From this menu, the appropriate Voice information for working with the Voice Gateway is entered.)
<b>6</b>	Select <b>CONFIG</b> , and from the <b>CONFIG</b> menu, enter the Gateway type under <b>CALL CONTROL</b> and enter the VPI and VCI values for communicating with that Gateway.  <b>CALL CONTROL</b> should be set to the Gateway type and the VPI and VCI values should be set appropriately for your network.
<b>7</b>	To verify correct setup, use the <b>STATUS</b> menu (under the <b>VOICE</b> menu) to look at the current status of the voice connection.  Under <b>STATUS</b> , you can view the <b>GATEWAY STATS</b> and information about the voice PVC along with information about the ISDN ports available on the Gateway.  The <b>GATEWAY STATS</b> menu should show the Gateway Link is up (if everything is configured correctly).  A visual inspection of the <b>VOICE</b> LED on the front panel will also yield the status. Green = up. Red = Down.

## Appendix F. RFC1483 Quick Start (IP Routing)

The TA 544 allows for complete integration of voice and data delivery from one compact platform (see Figure 21). Once you have completed the voice turn up procedure from the previous example, adding data to the circuit requires some additional setup.



**Figure 21. Application Diagram**

To configure a TA 544 for IP routing, you need to know the VPI and VCI values for the data circuit on your network. You also need the IP address of the next hop router in the circuit.

The table on the next page shows how to configure the TA 544 for IP Routing.



<b>IP Routing</b>	
<b>Step</b>	<b>Action</b>
<b>1</b>	From the TA 544 main menu, select the <b>WAN</b> menu. (Here you set up the ATM network.)
<b>2</b>	Select the <b>ATM CONFIG</b> menu.
<b>3</b>	Enter the <b>IDLE CELLS</b> format for your network.
<b>4</b>	Set <b>DATA SCRAMBLING</b> appropriately for your network.
<b>5</b>	Back all the way out to the top level TA 544 menu, and then select the <b>ROUTER</b> menu.
<b>6</b>	Select <b>CONFIGURATION</b> . From the <b>CONFIGURATION</b> menu, you will set up addresses for your LAN and WAN. For basic IP routing, use all the default values from the <b>GLOBAL</b> menu.
<b>7</b>	From the <b>ETHERNET</b> menu, enter the <b>IP</b> menu to enter your LAN configuration.
<b>8</b>	Enter your LAN <b>IP ADDRESS</b> , <b>SUBNET MASK</b> , and <b>DEFAULT GATEWAY</b> information. For this example, the <b>IP ADDRESS</b> is 192.168.1.2, the <b>SUBNET MASK</b> is 255.255.255.0, and the <b>DEFAULT GATEWAY</b> is 10.25.4.10.
<b>9</b>	Arrow back to the main <b>ROUTER CONFIGURATION</b> menu, and select the <b>WAN</b> menu and then the <b>ATM</b> menu. (Here you will enter your data PVC information.)
<b>10</b>	Create a new PVC by entering the menu. Enter your VPI and VCI values.
<b>11</b>	From the <b>RFC1483 IP</b> menu, enter your LAN information. For this example, the <b>FAR END IP ADDRESS</b> is 10.25.4.9, the <b>IP NETMASK</b> is 255.255.255.252, and the <b>LOCAL IP ADDRESS</b> is 10.25.4.10.
<b>12</b>	Arrow back to the top level TA 544 menu to activate your changes.

## Appendix G. RFC1483 Quick Start (IP Routing with NAT)

To illustrate the use of NAT, consider the example from Appendix E. To set up a single public address that will be used to access the public network, you will use the **NAT** menu on the **WAN/ATM/RFC1483 IP** menu.

IP Routing with NAT	
Step	Action
1	From the <b>NAT</b> menu, set <b>NETWORK ADDRESS PORT TRANSLATION</b> to <b>ENABLED</b> . (This will enable translation and allow you to enter the NAT options.)
2	Set <b>PUBLIC IP ADDRESS MODE</b> to <b>SPECIFIED</b> so you can enter your public address. During transmission, private addresses are translated into this public (NAPT) address.
	You will also need to set up the <b>TRANSLATION TABLE</b> to do translation on the body of the packets for certain protocols, such as FTP, to work correctly.
3	From the <b>TRANSLATION TABLE</b> menu, create a new entry by arrowing into the table.
4	For <b>PUBLIC ADDRESS MODE</b> , select <b>NAPT ADDRESS</b> to use the previously specified public address.
5	For <b>PROTOCOL</b> , select <b>TCP</b> .
6	Make sure that <b>TRANSLATE BODY</b> is set to <b>YES</b> .

## Appendix H. RFC1483 Quick Start (Bridging)

The TA 544 allows for complete integration of voice and data delivery from one compact platform. Once you have completed the voice turn up procedure from the previous example, adding data to the circuit requires some additional setup.

To configure a TA 544 for Bridging, you need to know the VPI and VCI values for the data circuit on your network.

Bridging	
Step	Action
1	From the TA 544 main menu, select the <b>WAN</b> menu. (Here you set up the ATM network.)
2	Select the <b>ATM CONFIG</b> menu.
3	Enter the <b>IDLE CELLS</b> format for your network.
4	Set <b>DATA SCRAMBLING</b> appropriately for your network.
5	Back all the way out to the top level TA 544 menu, and then select the <b>ROUTER</b> menu.
6	Enter the <b>CONFIGURATION</b> menu. From this menu, you will set up addresses for your LAN and WAN. For basic IP routing, use all the default values from the <b>GLOBAL</b> menu.
7	From the <b>ETHERNET</b> menu, enter the <b>IP</b> menu to enter your LAN configuration.
8	Enter your LAN <b>IP ADDRESS</b> and <b>SUBNET MASK</b> . For this example, the <b>IP ADDRESS</b> is 192.168.1.2 and the <b>SUBNET MASK</b> is 255.255.255.0. This is not required, but will allow Telnet configuration and TFTP upgrades from the LAN.
9	Arrow back to the main <b>ROUTER CONFIGURATION</b> menu, and select the <b>WAN</b> menu and then the <b>ATM</b> menu. (Here you will enter your data PVC information.)
10	Create a new PVC by entering the menu. Enter your VPI and VCI values.
11	Disable IP on the <b>RFC1483 IP</b> menu and enable Bridging on the <b>RFC1483 BRIDGE</b> menu. (This enables the TA 544 as a bridge.)
12	Arrow back to the top level TA 544 menu to activate your changes. All packets that come in on the Ethernet will be forwarded on the WAN.

## Appendix I. PPPoA Quick Start Guide

Step	Action
1	Create the data VPI/VCI by going to the <b>ROUTER/CONFIGURATION/WAN/ATM</b> menu. Use the right arrow key to enter the menu. This will create a data PVC entry for which the appropriate VPI/VCI can be entered.
2	Select <b>PPPoATM</b> from the <b>PROTOCOL</b> field. Then right arrow over to the <b>PPPoATM</b> entry point (denoted by a [+]) and press <b>Enter</b> .
3	From the <b>ROUTER/CONFIGURATION/WAN/ATM/PPPoATM</b> menu, the implementation-specific PPP parameters can be entered.  A typical application requires authentication, which is done on the <b>AUTHENTICATION</b> menu. The <b>Tx METHOD</b> specifies the type of PPP authentication used to authenticate the IAD. The <b>Tx USERNAME</b> and <b>Tx PASSWORD</b> are those sent by the IAD to the far-side authenticator. The <b>Rx USERNAME</b> and <b>Rx PASSWORD</b> are those that the IAD expects to receive when the IAD is authenticating the far-side. (The <b>Rx METHOD</b> is specified in another location, discussed below.)
4	Most applications require IP to be negotiated on the link. This is done by setting <b>IP MODE</b> to <b>ON</b> on the <b>IP</b> menu. Addresses can be specified by the user or they can be left blank if the far-side assigns the IP addressing to the IAD during IPCP negotiation. RIP and NAT can be turned on here, if required.
5	The <b>PPP</b> menu allows the user to specify the encapsulation mode: VC-Mux or LLC. The remaining default settings should be sufficient for typical applications.
6	If IP is to be negotiated on the link, IP routing must be globally enabled in the IAD. This is done from the <b>ROUTER/CONFIGURATION/GLOBAL/IP</b> menu, where the <b>MODE</b> is set to <b>ON</b> .
7	If the application requires the IAD to authenticate its peer, the <b>Rx METHOD</b> must be specified. This is done from the <b>ROUTER/CONFIGURATION/GLOBAL/SECURITY</b> menu, where <b>AUTHENTICATION</b> should be set to <b>PPP</b> and the <b>METHOD</b> is specified under the <b>PPP</b> parameter.