T-40 SERIES
COMMAND REFERENCE

RELEASE 25.1

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TABLE OF CONTENTS

1 INTRODUCTION

This document is a compendium of manual pages used for the administration of the **T-40** Series devices. The information contained is derived from the now deprecated user manual.

This document is **only** the command reference. See the application notes for specific information about deploying the interfaces.

- Commands may be entered in upper or lower case.
- Parameters of the form **name=<value>** may use upper or lower case for **name**.
- Case is preserved for values.
- Backspace erases one character.
- Changes are cumulative.

After running a configuration command (especially those with many parameters) it is always a good idea to run the corresponding **verify** command, to check for any defaulted values which may need to be overridden.

2 AUTHORIZATION

The T-40 has a single master administrator User ID “admin”, and many configurable User IDs. The “admin” User ID is of the highest authority, level 4. The definable User IDs may be of any level. In addition, the definable User IDs may be restricted to a subset of ports for situations where a single T-40 is shared among organizations. Any of the User IDs may be used on any console.

The following table is a synopsis of the command reference with the minimum authorization required.

Command	Synopsis	Authorization
Banner	Notice Definition	Level 4
Chgpass	Change User ID Password	General
Clear	Clear Measurements & Logs	Level 1
Console	Define OA&M Consoles	Level 3
CUG	Define Closed User Groups	Level 3
Date	Report NTP Date	General to report, Level 4 to set.
DBReset	Complete device DB reset.	Level 4 from Serial Port Console Only.
Dconn	Display Connections	General
Diag	Diagnose User Port	Level 2. Subject to authorized port list.
Disc	Disconnect Port	Level 4 to disconnect a network console. Level 2 for port subject to port list.
Dmeas	Display Measurements	General
DNS	Configure DNS Servers	Level 4
Dstat	Display Status	General. Subject to authorized port list.

Help	Command Listing	General
Host	Define Host Names	Level 3
Logout	Log off & Drop Connection	General
Net	Define Network Interface	Level 4. Serial Console Recommended.
NTP	Define Network Time Protocol	Level 4.
Ping	ICMP Ping	Level 1.
Port	Define Port Parameters	Level 2. Subject to authorized port list.
Reboot	Reboot the device.	Level 4.
Remove	Remove an object from SVC.	Level 4 for Module or Network Interface. Level 2 for Port subject to port list.
Restore	Restore an object to SVC.	Level 4 for Module or Network Interface. Level 2 for Port subject to port list.
SNMP	Define SNMP Agent	Level 3.
Snoop	Protocol Snooper	General subject to authorized port list.
SVCMAP	SVC NPN+DNIC to IP Address Mapping	Level 2.
Tacplus	Define TACACS+	Level 4.
Timeout	Set OA&M Timeouts	Level 4.
Trte	Traceroute	Level 1.
Uprompt	Define User Prompt	Level 3 subject to authorized port list.
User	Define User IDs & Options	Level 4.
Vfy	Verify	General subject to authorized port list.
version	Software Version IDs	General
Who	Whom is logged in.	General

3 BASE CONFIGURATION COMMANDS

3.1 LOGOUT

Syntax: logout

This command returns the unit to its logged-out mode, thus preventing unauthorized access.

3.2 CHANGE PASSWORD

Syntax: chgpass

This command allows a specific USER ID to change a previously configured password. The user will be prompted to enter the current password phrase; and a new password phrase. After confirmation, the password will be changed. No other User IDs are affected.

The password phrase may contain spaces and alphanumeric characters. It is case sensitive. Characters are echoed with an asterisk.

3.3 NET

Syntax: net <LAN ID> [addr=<IPv4 address> | <IPv6address> | NONE]
[gateway=<IPv4 address> | <IPv6address> | NONE]
[submask=<IPv4 submask>]
[prefix=<IPv6 Prefix #Bits>]
[tcpunreach=< ICMP | RESET | FIREWALL >]
[phy=< LAN Speed Configuration >]

This command sets up IP networking for the specified network interface. The **<IPv4 address>** parameter is the **IPv4** address of this unit. The **submask** parameter is the **IPv4** subnet mask of the LAN segment on which this unit is located, with an **IPv4** default value of 255.255.255.0.

The operation of the unit, when it is called to an invalid TCP port, is specified with the **tcpunreach=<ICMP | RESET | FIREWALL>]** parameter. When set to **ICMP**, the

caller is sent an “ICMP Port Unreachable” message. When set to **RESET**, the TCP connection is sent a TCP reset to the initiator. When set to **FIREWALL**, the request is inhibited. Unlike all other options of this command, changing the **tcpunreach** option does not require the LAN to be out of service.

The **IPv6** may be administered with the **[addr=<IPv6 address>]** argument. The **<IPv6 address>** is either a full or an abbreviated IPv6 address (e.g. FEC0::D4).

Setting the **addr** to **NONE** will set both the **IPv4** and the **IPv6** device address to a default condition.

The **IPv6** router gateway address is administered with the **[gateway=<IPv6 address>]** argument. Setting the **gateway** to **NONE** will set both the **IPv4** and the **IPv6** gateway address to a default condition.

The network prefix size for the **IPv6** addresses may be configured with the **[prefix=<IPv6 Prefix #Bits>]** option. The value of the prefix defaults to 64 bits which is the recommended by RFC 4291.

Each network interface may have **both IPv4** and **IPv6** addresses and gateways configured. Both protocol sets operate simultaneously.

The **[phy=< LAN Speed Configuration >]** allows the configuration of each LAN interface to negotiate with the ether-switch. A value of **AUTO** will allow the interface to negotiate both the speed and duplex with the ether-switch. A value of **AUTOHDX** will allow the interface to negotiate the speed with the ether-switch but the duplex is fixed at half duplex. A value of **10HDX** sets the interface to a fixed 10Mbps Half Duplex. A value of **10FDX** sets the interface to a fixed 10Mbps Full Duplex. A value of **100HDX** sets the interface to a fixed 100Mbps Half Duplex. A value of **100FDX** sets the interface to a fixed 100Mbps Full Duplex. The default configuration is **AUTOHDX**.

3.4 Network Time Protocol Server

Syntax: ntp < PRI | SEC > [ipaddr=<IP Address> | NONE]
[port=<UDP Port>]
[interval=<#Seconds>]
[tz=<TimeZone>]
[ENABLE]
[DISABLE]

The **ntp** command allows the configuration of up to two Network Time Protocol servers for the device. The servers are used as a primary server and a secondary server, although they may be individually disabled. The Network Time Protocol is defined in RFC 2030.

The **< PRI | SEC >** syntax specifies which server is to be configured. A server may not be configured while enabled

The **[ipaddr=<IP Address>]** specifies the IP address of the configured server. The **<IP Address>** may be either an **IPv6** address or an **IPv4** address. Only one address (of either type) is configured for an NTP server.

The **[port=<UDP Port>]** specifies the UDP port to use when communicating with the server. The RFC 2030 Network Time Protocol service defaults to UDP port **123**, but any port may be specified.

The **[interval=<#Seconds>]** specifies the number of seconds to elapse between synchronization requests to the Network Time Protocol Server. This value defaults to 1024 seconds. It may be set to any value greater than 64 seconds.

The **[tz=<TimeZone>]** specifies the local time zone to be used when adjusting the time for use on the TL1 headers. The Network time is always maintained in GMT worldwide. The TZ may be an alpha string such as **ADT**, **AST**, **EST**, **EDT**, **CST**, **CDT**, **MST**, **MDT**, **PST** and **PDT**. These standard times represent a time zone of 5, 6, 7, and 8 hours respectively. A numeric value may be entered for areas that do not have a designated time zone. Contact the author if another alpha designation for time zone is desired.

The **T-40** supports automatic daylight savings time. When a daylight savings time zone is selected (i.e. **AST**, **EDT**, **CDT**, **MDT**, or **PDT**); the **T-40** will automatically change to Daylight Savings on the 2nd Sunday in March, and return to Standard time on the 1st Sunday in November as required by United States Statute.

The default is **GMT**, and that is also the default on many operations systems that would interface with the **T-40**.

The **ENABLE** command allows this server to be used for service, and prevents further configuration.

The **DISABLE** command prevents this server from being used for service, and subsequently allows configuration.

The **T-40** will check for the time of day on a regular basis to minimize clock drift. The server is inquired least once per day. The **T-40** uses the “unicast” method to communicate with the network time servers.

The **date** may be manually set using the over-ride:

date SET yyyy-mm-dd hh:mm:ss

where hh is a 24 hour clock. However, time will be lost if the **T-40** is rebooted; and the accuracy will degrade over time. This can be used for short term functions where a network time server is not available.

The current date and time settings may be inquired at any time using the **date** command without any arguments.

3.5 DOMAIN NAME SERVER

Syntax: dns [ipaddr1=<IPv4 or IPv6 Address> | NONE]
[ipaddr2=<IPv4 or IPv6 Address> | NONE]
[ipaddr3=<IPv4 or IPv6 Address> | NONE]
[name1=<Domain Name>]
[name2=<Domain Name>]
[name3=<Domain Name>]

The **dns** command is only visible when the unit is logged in.

Each **ipaddrX** field is the IP address of a Domain Name Server to be used for mnemonic addresses not defined in the host table. When set to **NONE**, the DNS functions are disabled. The DNS addresses are used in order. If only one address is to be defined, it is required to be **ipaddr1**.

The **name1**, **name2**, and **name3** parameters are domain names. These domain names are appended to a dial string which is not fully specified for DNS purposes. For example, a name “bender.ho.lucent.com” is fully specified, so nothing is appended. A name such as “bender” would need to have a domain appended before the DNS server could resolve it. The unit will append the specified domain names in the order of **name1** through **name3**, and send the resulting strings to the DNS server in succession until the latter is able to perform a resolution.

3.6 TACACS+ RADIUS SERVERS

Syntax: tac < PRI | SEC > [ipaddr=<IPv4 or IPv6 Address> | NONE]
[port=<TCP Port>]
[key="Encryption Key" | NONE]
[ENABLE]
[DISABLE]

The **tacplus** command is only visible when the unit is logged in. The tacplus command allows the configuration of up to two **TACACS+** RADIUS servers for the device. the servers are used as a primary server and a secondary server, although they may be individually disabled.

The **< PRI | SEC >** syntax specifies which server is to be configured. A server may not be configured while enabled.

The **[ipaddr=<IPv6 or IPv4 Address> | NONE]** specifies the IP address of the configured server. The address may be either an **IPv6** address or an **IPv4** address. Setting the address to **NONE** clears the field.

The **[port=<TCP Port>]** specifies the TCP port to use when communicating with the server. The TACACS+ service defaults to TCP port 49, but any port may be specified.

The **[key="Encryption Key" | NONE]** specifies an encryption key to use. The Encryption key must be enclosed in double quotes, and the double quotes are not part of the key. If no encryption is desired, the value of **NONE** is used to designate unencrypted service.

The **ENABLE** command allows this server to be used for service, and prevents further configuration.

The **DISABLE** command prevents this server from being used for service, and subsequently allows configuration.

3.7 HELP

Syntax: help

This command produces a display of the entire command set and syntax available for the USER ID currently logged into the console. The list of commands will alter based on the authorization level of the USER ID.

3.8 VERSION

Syntax: ver

This command displays the current software on each processor and database revisions of the unit and is only visible when the user is logged in. The **ver** command also displays the authorization level of the user currently logged into the administrative console. The command has no arguments. If new software has been downloaded and no reboot has been performed; the new software version is also displayed.

3.9 REBOOT

Syntax: reboot [newip=<New IPv4 Address>]
[newmask=<New IPv4 Network Mask>]
[newgate=<New IPv4 Gateway Address>]

This command resets the unit, which allows configured physical attributes to take effect.

The command is only visible if the user is logged in. The command has optional arguments to allow the remote alteration of the network configuration. If any network configuration change is required, the user is prompted for the password as a verification check before the reboot is actually executed. After the reboot, the console interface returns to the logged-out mode.

A **reboot** command with LAN re-configuration will be applied to the same LAN on which the reboot command was entered. A **reboot** command entered on the serial console affect LAN1.

The **reboot** command will always prompt for a password for validation purposes even if the administrator is logged at the appropriate level or higher. The TACACS+

servers must be disabled to change the LAN configuration via a reboot command. They may be re-enabled after the reboot has taken place.

3.10 REMOVE MODULE

Syntax: remove mod

This command is only visible when an administrative user is logged into a console. This option is only valid on the serial console for obvious reasons. The command has no additional arguments. The command takes the unit out of service. This command must be performed before any unit-level configuration changes can occur.

The **remove mod** command will always prompt for a password for validation purposes even if the administrator is logged at the appropriate level or higher.

3.11 RESTORE MODULE

Syntax: restore mod

This command is only visible when the user has appropriate authorization. The command has no additional arguments. It returns the unit to service.

3.12 REMOVE NETWORK INTERFACE

Syntax: remove < LAN1 | LAN2 >

This command is only visible when the user has appropriate authorization. The argument specifies which interface is to be taken out of service. This command must be performed before any configuration may be performed on the specific network interface.

3.13 RESTORE NETWORK INTERFACE

Syntax: restore < LAN1 | LAN2 >

This command is only visible when the user has appropriate authorization. The argument specifies which interface is to be placed into service.

The operation will not be allowed from a network console that is presently using the LAN PHY requested.

3.14 CLEAR

Syntax: clear < meas >

This command is only visible when the unit is logged in. When the argument value is **meas**, the current measurements are all set to zero. No other options are allowed at this time.

3.15 DISPLAY MODULE MEASUREMENTS

Syntax: dm mod

This command displays the current, unit-level measurements in a formatted report on the console (see for an itemization of the unit-level measurements at the end of this manual). **Port** information is not displayed on the unit-level report.

3.16 VERIFY MODULE

Syntax: vfy mod

The command displays the unit-level configuration in a formatted report on the console.

3.17 HOST NAME ADMINISTRATION

Syntax: host <host #> [name=<host name>]
[ipaddr=<IPv4 or IPv6 Address> | NONE]
[port=<TCP port>]
[DEL]

The units all support mnemonic destination name translation for non-PDD originating user ports. These mnemonic names are translated into an IP address and TCP port during call setup. The **host** command is used to configure the translation table

The **name** field is a mnemonic for a destination up to nine characters in length. The **ipaddr** (of the host) and TCP **port** (on the host) parameters specify the translation to be performed during call setup. If the parameter **del** is used, the entry is deleted.

3.18 VERIFY HOST

Syntax: vfy host

This command displays host-address configuration in a formatted report on the console.

3.19 SNMP

Syntax: snmp [ipaddrX= < Trap Manager IPv4 or IPv6 Address > | NONE]
[portX= < trap mgr port >]
[CUG=<<+|-> CUG Number>]
[PUBLIC=< YES | NO >]
[COMM="Double Quoted String" | NONE]
[SYSCONTACT="Double Quoted String" | NONE]
[SYSNAME="Double Quoted String" | NONE]
[SYSLOC="Double Quoted String" | NONE]

This command is used to configure the IP address of each SNMP trap manager. Up to ten SNMP managers are currently supported, and indicated by the **X** on the command. The value of **X** may be **1** through **10**. All SNMP trap managers are treated equally and will be sent each trap.

Since traps are unsolicited alarms, an agent can take the initiative to inform the manager of the occurrence of a predefined condition. Typical conditions include the cold-start or warm-start of equipment and a link-down or link-up condition.

A single, or multiple SNMP managers, may simultaneously poll the device using the SNMP protocol. However, only SNMP managers defined on via this command will be the trap managers.

The **ipaddrX** field defines the IP address of the SNMP manager to which the traps are to be sent. The address may be either an **IPv4** address or an **IPv6** address. Using the value of **NONE** clears the field.

The **portX** field indicates the UDP port on that SNMP manager and defaults to the standard value of 162.

Any combination of closed user group membership may be assigned to the SNMP interface using the parameter of **cug=[+|-]<CUG Number>**. The closed user group membership is displayed on the "verify module" output. Packets which have failed the SNMP Closed User Group Test are discarded. An alarm is not presented, but the failure is counted. The number may be displayed with the "dmeas mod" command.

The unit allows setting of an SNMP community in addition to the *public* community. The *public* community is recognized when the **[PUBLIC=YES]** option is selected. Recognition of the public community is the default operation. When **[PUBLIC=NO]** is selected, the *public* community is not recognized.

The **T-40** allows setting of an SNMP community in addition to the *public* community. When configured, the **T-40** will respond to SNMP manager requests in that community. The **T-40** will always respond to a request in the *public* community. The settable SNMP community is configured with the **[COMM="Double Quoted String" | NONE]** option. The community may be in any case. The double quote encapsulation is not part of the community string. The settable community may be cleared by setting it to the keyword **NONE**.

The MIB-II variables sysName, sysContact, and sysLocation may be initialized from the **T-40** non-volatile database using the **SNMP** command. These variables are volatile in that they may be over-written by an SNMP manager. However, any change made by the SNMP manager will not impact the **T-40** non-volatile database. Setting the value to **NONE** will clear the entries in the **T-40** non-volatile database. Each field may be of 31 characters or less. The double quote encapsulation is not part of the respective variable. Any of the variables may be cleared by setting it to the keyword **NONE**.

3.20 CONSOLE TIMEOUT

Syntax: timeout [off | < number of minutes >]

The **T-40** hardware platform serial console uses a three-wire interface (RD, TD, GND), and the lead state of other signals is not relevant. This would imply that the

only way to change the state of the serial console is to explicitly log in or log out or via a reboot or reset, which forces the serial console to be logged out.

For users who wish a console to automatically log off after a period of inactivity, there is a console timer. The console timer defaults to the disabled condition, and may be activated by the **timeout** command. This command is only visible when the console is logged in. The **<number of minutes>** value must be between 1 and 255, inclusive. When the **T-40** determines a period of inactivity of the specified time, it automatically forces the console to log off. An **INFO**-level alarm is issued at that time. The console timer applies to all consoles, network and serial, equally.

Please note that any of the network consoles are automatically logged out when disconnected, or when an explicit logout command is issued. Inactivity when the console timeout is active will also automatically log off a network console. HTTP consoles are not affected by the console timeout feature.

3.21 CONSOLE DEFINITION

Syntax: con <Console ID> [type=< TELNET | SSH >]
[phy=< LAN1 | LAN2 | ANY >]
[port=<TCP Port #>]
[label=< "Double Quoted String" | NONE]
[cug=[+|-]<CUG Number>]

The **console** command is used to define options for any of the consoles. The serial console has a **<Console ID>** of **SER**. The eight network consoles have a **<Console ID>** of **NET1** through **NET8** inclusive. Only the label is changeable on the serial console.

On each of the network console, the protocol may be specified as either **TELNET** or **SSH**. The **TELNET** protocol is the default, and recommended. Any **T-40s** for export may not have the **SSH** option due to federal restrictions on the cryptography algorithms used by the **T-40**.

The **[phy=< LAN1 | LAN2 | ANY >]** specifies the interface the network console is to use. The option is not valid for the serial console. If a value of **LAN1** is used, the network console will only be available on the **LAN1** interface. If a value of **LAN2** is used, the network console will only be available on the **LAN2** interface. If the console is desired on either LAN interface, the value of **ANY** will achieve that result.

The **[port=<TCP Port #>]** option specifies the TCP port that the network console is to use. If multiple consoles are to be placed into a hunt group, all that is needed is to give the same TCP port number to each.

The **[label=< "Double Quoted String" | NONE]** defines a label to use with the console. Each console may have a different label. This option is valid for the serial console. This is useful for fragmenting a **T-40** across organizations or users. The value of **NONE** deletes any current label assigned to the console. The label to be assigned is a double quoted string. The console label may be up to 31 characters in length.

The **[cug=[+|-]<CUG Number>]** option allows the assignment of a closed user group to each network console. The **< CUG Number >** is the closed user group identifier as defined with the **cug** command. A prefix of **+** will add the **<CUG Number>** to the list associated with the telnet console. A prefix of **–** will delete the **<CUG Number>** from the list associated with the console.

3.22 VERIFY CONSOLE

Syntax: vfy con

This command displays the configuration on all nine consoles and their respective service states in a formatted report.

3.23 PING

ping <LAN ID> <IPv4 or IPv6 Address> [Interval Seconds]

The **ping** command is only visible when the user has authorization. The command has two required arguments, the network interface to use and the IP address that is to be pinged.

The **<LAN ID>** is **LAN1** or **LAN2** as required.

The **ping** command formats an ICMP echo request packet which is then sent to the IP Address specified. The device with that address will issue an ICMP echo reply to the request. This is required of all IP implementations by RFC 791. If a reply is received, an informational alarm is issued on the UMI console. If no reply is received, there is a timeout message that will appear for that ICMP echo request.

The ping command issues a single ICMP echo request packet and awaits a response. The response is printed, and another ICMP echo request is issued. The operation continues until the user presses *any* character. The **[Interval Seconds]** argument specifies the amount of time to wait in seconds between the individual ICMP echo requests.

It should be noted that some host Internet Protocol implementations issue duplicate responses to a single ICMP request. The **ping** command will suppress duplicate replies.

3.24 TRACEROUTE

trte <LAN ID> <IPv4 or IPv6 Address>

The **trte** command is only visible when the user has authorization. The command has two required arguments, the network interface to use and the IP address that is to be pinged.

The **<LAN ID>** is **LAN1** or **LAN2** as required.

The **trte** command formats an ICMP echo request packet that is then sent to the IP Address specified. The valid packet "time to live" is set to an initial value of "1". If the IP address is on the local subnet, the ICMP echo will respond immediately. If the IP address is on a different subnet, the gateway router will decrement the "time to live" upon routing the packet. When the "time to live" reaches zero, the gateway sends an ICMP "time exceeded" message to the **T-40**. The **T-40** then displays the gateway device, and increments the "time to live" on the next ICMP echo request packet. This continues until the IP address is reached. The result is a display of all the intermediary gateway devices used to reach the IP address from the **T-40**.

If no answer is received, each "time to live" value is tried 3 times before an increment. The timeout is 5 seconds for each attempt. The maximum number of "time to live" is set to 30 in this build of the **T-40**.

Since a traceroute command can be unusually long in duration, any character sent to the console will interrupt the operation of the traceroute command.

3.25 DATA-BASE RESET

Syntax: dbreset

This **dbreset** command returns the **T-40** to the default configuration set up by the factory. The admin password will return to the factory default of ***initial***.

The **dbreset** command will always prompt for a password for validation purposes even if the administrator is logged at the appropriate level or higher.

The **dbreset** command is only available to an administrator and only from the serial console.

3.26 DISCONNECT CONSOLE

Syntax: disc console <Console ID>

The **disc** command is only visible when the user has authorization for its use. The command will disconnect a console that is presently connected to the **T-40**. This is

useful in IP networks when the remote peer vanishes due to a remote reboot or a network error.

The **disc** command will always prompt for a password for validation purposes. Only the highest administrative authorization is allowed to disconnect a network console.

3.27 ADMINISTER SECURITY BANNER

Syntax: banner [clear] [L#="Line # Message"]

The **banner** command is only visible when the user has appropriate authorization. It is used to administer the security banner. The default is a NULL banner. If a security banner is configured, it is displayed at each user login. The **clear** option is a shortcut to erase the entire message.

3.28 CLOSED USER GROUP (CUG) ADMINISTRATION

Syntax: cug < cug num > [ipaddr=< IPv4 or IPv6 Address> | NONE]
[submask=<IPv4 Subnet Mask>]
[prefix=<IPv6 number of Prefix Bits>]

The **cug** command is only visible when the unit is logged in. The **<CUG_num>** parameter is the closed user group identifier used to assign the CUG to a user port (with the **port** command), or the console (with the **console** command). The **<CUG_num>** may be a value between 1 and 16, inclusive.

A single IP address and subnet mask pair specifies each CUG. The **ipaddr** parameter is an address of an endpoint (or base address of a group of endpoints) to be allowed into the group.

For **IPv4** addresses, the **ipaddr** value *ANDed* with the **submask** value must agree with the caller's or destination's IP address *ANDed* with the same **submask** for a call to be allowed to or from a user port to which the CUG is assigned. Depending on the **submask** value, this allows an individual (submask=255.255.255.255), intermediate, or network-wide level of authorization.

For **IPv6** addresses, the **prefix** determines the masking used. A number of prefix bits of 128 would be exact match of the address. Setting the **prefix** to 64 would match an entire RFC4291 compliant subnet. Generally the CUG address **prefix** is set between 64 and 128 to match specific endpoints.

Setting the **ipaddr** value to **NONE** deletes any prior configuration for the **<CUG_num>**. A **<CUG_num>** may not be deleted if it is currently assigned to any user port.

A list of all configured CUGs is reported via the **vfy cug** command. The list of closed user groups associated with a given user port is presented in response to the **vfy port** command.

3.29 USER ID CONFIGURATION

Syntax: user <Tag> [login="Double Quoted String"]
[passwd="Double Quoted String"]
[auth=<Authorization Level>]
[tacop=< BEFORE | AFTER | NEVER >]
[ports=< [+][-] <Range> | ALL | NONE >]
[DELETE]
[ACTIVATE]
[DEACTIVATE]

This command is only visible when the user has authorization. The **user** command administers the USER ID list for the **T-40**.

The handle **<Tag>** is a numeric value to identify a particular USER ID. The "admin" USER ID does not have a **<Tag>** and cannot be administered with this command. The value of **<TAG>** may be from 1 through the maximum number of users defined for the **T-40**. That number may change as needs demands. As of the time of this writing, it was set to 16.

The User ID, as used to gain access to the **T-40**, is defined by the **[login=”Double Quoted String”]** option. Please note that the User ID is not a word, and can be a complete name or pseudo name. For example, “Lucky Eddie” is a perfectly valid User ID. The quotes are not entered when the User ID is actually used. The length is limited to 31 characters including all spaces. Special characters are not allowed. The User ID is case sensitive.

When the User ID is created, it is given a default password of “**initial**”. That may be changed with the **[passwd=”Double Quoted String”]** parameter, or by the user with the **chgpass** command. The password may be a word or phrase up to 31 character in length including spaces. For example, “My dog ate my homework”, minus the double quotes, is a perfectly good password. The password is case sensitive.

Each User ID has an associated authorization level. That level implies which commands they are able to execute on the **T-40**. The list of the commands, and their required level, was at the beginning of this section. The authorization level for the user being defined is set with the parameter **[auth=<Authorization Level>]** with **<Authorization Level>** being **GEN**, **ADM1**, **ADM2**, **ADM3**, or **ADM4**.

The **[tacop=< BEFORE | AFTER | NEVER >]** option determines how the User ID defined is used when a TACACS+ server is defined and operational. The **BEFORE** attribute will allow the user ID to be verified before TACACS+ is inquired. The **AFTER** attribute will allow the user ID to be verified after TACACS+ is inquired and that inquiry has not be accepted by the TACACS+ server. The **NEVER** attribute means the User ID is never verified if there is an operational TACACS+ server.

By default, a User ID does not have authority to access any of the ports. That is given with the **[ports=< [+][-] <Range> | ALL | NONE >]** parameter. The signs on the range are to edit any already provided value. The value of **ALL** is equivalent to a range of **+1-40**, and the value of **NONE** is equivalent to the range of **-1-40**. The plus indicator on a given range is optional.

The User ID may be deleted entirely with the **DELETE** parameter. If a User ID in the middle of the list is deleted, the <Tag> associated with each user will be compacted on the next reboot of the **T-40**. But, an empty <Tag> may be re-used immediately if no reboot is performed.

The User ID may be made inactive, but not deleted, with a **DEACTIVATE** option. This eliminates the need to re-enter all the information when the User ID is again desired.

The User ID is made active with the **ACTIVATE** option if previously deactivated; or is a new user that has not yet been activated.

3.30 VERIFY USER

Syntax: vfy user

This command is only visible when the user has authorization. It displays a list of all the User IDs, and their related information in a formatted report. The passwords for each User ID are not displayed.

3.31 WHO

Syntax: who

This command is only visible when the user is logged in. It displays a formatted list of everyone logged into the **T-40** and how they are connected.

3.32 (B)X.25 SVC MAPPING

Syntax: svc <Tag> [port=< DELETE | < Serial Port# of SVC> >]
[calling=< < DELETE | < NPN+DNIC > >]
[called=< < DELETE | < NPN+DNIC > >]
[ipaddr=< IPv4 or IPv6 Address >]
[network=< LAN1 | LAN2 | ANY >]
[dport=< Destination TCP Port >]
[DELETE]

A VC may be configured as an originating SVC. That is, an SVC that expects a call request from the (B)X.25 interface towards the IP network. The (B)X.25 call request packet *may* contain a called address but the address is not required. Further, the (B)X.25 call request packet *may* contain the calling address but this address too is not required. These (B)X.25 addresses are of the form NPN+DNIC and are not usable within an IP infrastructure. The **T-40** uses a prioritized mapping table to deal with all the contingencies associated with this type of interface.

The mapping table uses an entry per association, and always searches the mapping table in incrementing tag order. That is, the first tag (#1) will always be searched before the 2nd, and so on. NULL (deleted) entries between valid mapping entries are allowed. The mapping table allows wildcard matches on the (B)X.25 calling and called addresses. The mapping table also allows exact maches. For example, it is possible to associate a different IP network destination based on the (B)X.25 calling address even if the (B)X.25 called address is the same. Matching an SVC call request with no (B)X.25 address specified is done with a wildcard on both (B)X.25 calling and (B)X.25 called address in the mapping table. Since the mapping table is always searched predictably, a hierarchy of mapping results can be easily created.

The **<Tag>** indicates the entry in the mapping table to be modified or deleted. The first entry value is **1**, and increments up to the number of entries in the table.

The **[port=< DELETE | < Serial Port# of SVC> >]** indicates the serial port on which the SVC is to arrive. Existing entries may be removed with a DELETE operation.

The **[calling=< < DELETE | < NPN+DNIC > >]** indicates the (B)X.25 NPN+DNIC calling address as expected on the SVC call request packet. Existing entries may be changed into a wildcard by a DELETE operation.

The **[called=< < DELETE | < NPN+DNIC > >]** indicates the (B)X.25 NPN+DNIC called address as expected on the SVC call request packet. Existing entries may be changed into a wildcard by a DELETE operation.

The **[ipaddr=< IPv4 or IPv6 Address >]** indicates the IP address to which the (B)X.25 address match is to be associated. An IP address is always required for a match.

The **[network=< LAN1 | LAN2 | ANY >]** indicates the network to use for the IP connection establishment. The value of **ANY** will use either network on alternate attempts.

The **[dport=< Destination TCP Port >]** indicates the TCP port at the IP destination endpoint to use in the connection request. It is always required, and may not be zero.

The **[DELETE]** option will delete the entire mapping entry. The space may be left empty and will be skipped for any address match attempts.

3.33 Verify (B)X.25 SVC Mapping

Syntax: vfy svcmap

This command displays the (B)X.25 SVC connection mapping table. There is a single mapping table used by all ports on the **T-40**. NULL entries are not displayed. Wildcard fields are displayed with an asterisk.

3.34 Event Logs

Syntax: event clear

event disp [< port <#> [vc <#>] >] [ALL]

event disp [< port <#> [rmt <#>] >] [ALL]

The event command manages the contents of the event logs. Event logs makes a record of “interesting” events. What is included in the logs is subject to enhancement, but at minimum includes all the interface connection and disconnect information.

At present, there are only two operations.

- To display the contents in the aggregate or with optional restrictions.

- To clear the logs in the aggregate.

To clear the event log, the **event clear** command is used.

To display the contents of the event log, the **event disp** command is used.

The display may be restricted to a particular port with the **port <#>** argument.

The display may be restricted to a particular circuit (VC or Remote) on a port with the **port <#> vc <#>** argument. The **rmt** and **vc** tags are interchangeable and only reflect that some protocols, such as E2A or various Byte Synchronous implementations, have remotes on a baseband multi-drop interface rather than individual virtual circuits.

By default, the display will emit up to a default number of records, currently 50, and issue an indication to the number of records that meet the output criteria and have not been emitted. The optional argument of **ALL** will emit all records which may be quite verbose.

The records on the event log are time stamped. If the Network Time Protocol is configured and enabled, this will be the time of the event. If the Network Time Protocol is not available, the time indication will be the number of seconds since the last reboot of the **T-40**.

The event log is volatile and does not survive a reboot.

The event log maintains a window of the most current events. When the event log fills, the oldest event is replaced with the most recent event.

3.35 USER PORT COMMANDS

The User Port commands are used to configure the operation of the individual RS-232C ports on the **T-40**. The ports are endpoints on an IP infrastructure. They may be configured to originate or receive connections by the commands in this section. When used with a "built in" X.25 mediation interface, the connectivity configuration is not required.

3.35.1 PORT

Syntax: port < PortNum > [type = < orig | rcv | X25 | SLM | LAPB | default >]
[net=< LAN1 | LAN2 | ANY >]
[pdd = < PDD DNS destination address >]
[dest = < IPv4 or IPv6 Address > | NONE]
[dport = <tcp port >]
[hport = <tcp port >]
[prot = < protocol >]
[dxe = < dce | dte >]
[clk = < norm | rcvd >]
[phy = < 232 | V35 | 530 >]
[baud = < baud rate >]
[pipeline = < #bytes | NONE >]
[enc = < nrz | nrzi >]
[ccar = < on | off >]
[ccts = < on | off >]
[swcar = <on | off >]
[pap = < on | off >]
[fill = < FLAG | MARK >]
[dbits = < 5 | 6 | 7 | 8 >]
[parity = < even | odd | none >]
[stop = < 1 | 1.5 | 2]
[attn = < 1brk | 2brk | none | char >]
[flow = < xon | hw | none >]
[cug = [+ | -] < cug num >]
[crfix = < trans | nonnull >]
[crlf = < trans | nolf >]
[PDDonCR = < on | off >]
[rxidle=< OFF | < # Idle Minutes > >]
[txidle=< OFF | < # Idle Minutes > >]
[connbrk=< OFF | ON >]
[comment = "user comment"]

```
[ moveto=<New Port Num> ]
[ copyto=<Port Number Range> ]
[ x25elm=<Companion Port #> | NONE ]
[ x25dxe=< DTE | DCE > ]
[ x25win=<LAPB Tx Window Size> ]
[ x25t1=< LAPB T1 Timer >]
[ x25n2=< LAPB N2 Retry Counter > ]
[ x25t3=< #Seconds | DISABLE | DEFAULT > ]
[ x25dar=< ON | OFF > ]
[ x25pass=< OFF | DFLT | "Password String" > ]
[ x25xid=< XID Link ID > ]


vc=<Range> [ vcsvc=< PAD | PASS | ISO
                      RBP | MAC  | SESS |
                      AEP | AEPN | AEPX | AEMLT > ]
           [ vcckt=< SVC | PVC > ]
           [ vctype=< ORIG | RCV > ]
           [ vcwin=<VC Tx Window> ]
           [ vcpkt=< 128 | 256 | 512 | 1024 > ]
           [ vcdbit=< ON | OFF > ]
           [ pvcreset=< ON | OFF > ]
           [ pvcrstlnk=< OFF | ON | CONSTDCD | SWDCD  >]
           [ vcpap=< LINKUP | ALWAYS > ]
           [ svctclass=< NONE | Throughput  > ]
           [ svcfac= < AUTO |  FORCED > ]
           [ padecho=< ON | OFF > ]
           [ paderase=< NONE | BS | <Hex Byte> ]
           [ padidle=< #X.3 Ticks > ]
           [ padbreak=< NONE | INTR |
                        RESET | BRKIND > ]
           [ padparity=< TRANS | EVEN | ODD >]
           [ padcrlf=<NONE | RMT | VC | BOTH>]
           [ padfilter=< NONE | PRINTABLE > ]
           [ padhdx=< OFF | ON  > ]
           [ padfwd=<NONE | CR | CRDROP |
                     SEMI | EXCL | ALL | GRPx        > ]
           [ padcmap=< ON | OFF > ]
           [ padapi=< RAW | TELNET > ]
           [ PADCUG=[+|-]<CUG Number> ]
           [ calling=< DEL | < DNIC+NTN >  >]
           [ called=< DEL | < DNIC+NTN > > ]
```

[ulen=< UData Length >]
[udata#=< HEX BYTE >]
[ext_calling=< DEL | < OSI NSAP > >]
[ext_called=< DEL | < OSI NSAP > >]
[hport=<VC Hunt Group TCP Port>]
[vccom="User Comment"]

This command configures an individual user port. The **<PortNum>** parameter is a number in the range of 1 through the N that corresponds to the RS-232C user port being configured.

When a port uses TCP/IP for communications, it is either a port which waits for an incoming call (**type=rcv**), or an originator of a call (**type=orig**). The (optional) PDD for an **orig-type** port is defined by **dest=<ipaddr>** and **dport=<tcp_port>**. A caller on an originating port without PDD information configured will be presented a **T-40 Destination>** prompt for "dialing". The **<ipaddr>** may be an **IPv6** address or an **IPv4** address.

Setting the **type=default** will reset all the port options to the factory defined default.

A port with **type=x25** is internally connected to a corresponding instance of the **X25PAD** application. The virtual circuits for the X.25 ports will default to a TCP port number of 30,000 for the 1st port plus the virtual circuit number (e.g. 30001, 30002, …). Each subsequent X.25 port will add 200 to this value. The second X.25 port begins at 30200, the third at 30400 and so on.

A port with **type=SLM** is internally connected to a corresponding instance of the **IP-SLM** application. The TCP port for the Operations System connection is 30000 plus 1 for the 1st port on the **T-40**. Subsequent ports increment the TCP port number by 200. For example, on port 5 the Operations System would connect on TCP 30801.

A port with **type=LAPB** is internally connected to a corresponding instance of the **LAPB** application. The TCP port for the Operations System connection is 30000 plus 1 for the 1st port on the **T-40**. Subsequent ports increment the TCP port number

by 200. For example, on port 5 the Operations System would connect on TCP 30801.

When the PDD destination information is specified with the **pdd=<DNS destination address>** option, the **T-40** uses the specified DNS server to resolve the name. A DNS server address must be entered prior to configuration of any of the ports. The **pdd** parameter is mutually exclusive with specifying the IP address directly via the **dest** and **dport** parameters. A value of none (i.e. **pdd=none**) will clear the DNS destination address.

A **rcv-type** user port is assigned a default TCP port number of 50000 + user port number, i.e., 50001 to 50040. The port may then be addressed uniquely at that address. However, when a specific TCP port number is specified via the **hport=<tcp_port>** option, it is used in lieu of the default value. Multiple ports may share the same TCP port number, to define a **hunt group**. When a connection is directed to a TCP port number associated with a **hunt group**, the **T-40** selects the next available physical port by round robin. The **hport** parameter only applies to **rcv-type** ports. Please note that rcv-type ports may be connected via **IPv4** or **IPv6** interchangeably.

The **hport** option also operates on virtual circuits to create hunt groups. This operation is selected when the **hport** option is used on an X.25 port. The virtual circuits must be specified. The virtual circuits need not be contiguous, and may span X.25 ports. For example, a 21 virtual circuit hunt group may be created by placing 7 virtual circuits each from three ports into the same TCP port number hunt group.

The **prot=<protocol>** option defines the protocol used by the port. It may take on the values of **Raw, Async, HDLC, SDLC, EBSC** (EBCDIC BiSync), **ABSC** (Ascii BiSync)**, UNI** (Uniscope BiSync), **ALC** (ALC BiSync)**, DDCMP**, **VIP** (VIP 7600 BiSync), **E2A** (E-Telemetry), or **DPS** (DPS Specific E-Telemetry). The default protocol is **Async**. The **Raw** protocol is asynchronous, without the benefit of Telnet RFC encapsulation. It is used for direct TCP connections to the user ports. Please send email to the author at angel@trdcusa.com or via telephone @ (386) 754-5700, with any other protocol requests.

The **dxe=< DCE | DTE >** option specifies the clocking and signaling mode of the port. The default value is DCE.

When the protocol is asynchronous, a **dxe** value of **DCE** implies that the port is operating as a modem device. It will assert CTS when presented with RTS. A value of **DTE** for the asynchronous protocol implies that the port is operating as a 2-wire DTE. When there is data available to send, it will assert RTS and wait for CTS before sending data. Please note that a four wire DTE interface should be configured as **DCE** even though is uses a DTE asynchronous connector.

When the protocol is synchronous (e.g. SDLC*)*, a **dxe** value of **DCE** implies that the **T-40** should generate the clock signals. This would require the standard synchronous DCE cable adapter. A **dxe** value of **DTE** implies that the **T-40** should accept the clock signals presented on the port. This would require the standard synchronous DTE cable adapter. When using a **dxe** of **DTE**, the baud rate specification is still required. The clocking may be external, but the appropriate resource allocation is still necessary.

When the protocol uses a recovered clock instead of a separate clock lead (e.g. SDLC NRZI two wire), the **dxe** value operates like the asynchronous protocol described above since external clocking is not necessary. The appropriate recovered clock adapters should be used. The standard asynchronous and/or synchronous adapters should not be used. The appropriate recovered clock adapters are depicted in the cabling section.

The **clk=< NORM | RCVD >** option specifies the location of the clock signal. A value of **NORM** indicates that the clock signals are present on the TxC and RxC leads. This is the normal operating mode for synchronous protocols. A value of **RCVD** indicates that the clock signals are presently encoded in the data stream. This is valid for NRZI and FM encoding of the data stream for any protocol.

The **phy=<232 | V35 | RS530 >** option specifies the physical interface specification to be used on the user port. The DB25 user ports directly support the signal levels without additional equipment. This option is not applicable to RJ45 user ports.

The **enc=<NRZ|NRZI>** option specifies the physical encoding of the line. The default is Non-Return to Zero (NRZ).

The **ccar=<ON|OFF>** field defines constant carrier. This is an option in which the CD (or DTR if the port is a DTE) EIA signal is maintained asserted regardless of call status. The constant carrier feature is mutually exclusive with switched carrier.

The **ccts=< ON | OFF >** field defines constant clear to send. This is an option in which the CTS EIA signal is maintained asserted regardless of the state of the RTS EIA signal. It is only applicable to ports defined as DCE. Normally, the CTS lead reflects the state of the RTS lead provided by the attached device. This option breaks that relationship.

The **swcar=<ON|OFF>** field defines a switched carrier for the **T-40** port. This is an option in which the CD EIA signal is switched consistent with two-wire modem operation. It is designed only for DCE operation. That is, CD is active just prior to and during data transmission to the connected device. It is inactive otherwise without regard to the state of the TCP connection.

The **pap=<ON|OFF>** field defines a permanently active port. The default value is OFF. Setting this flag ON means that the port is ready to communicate regardless of its DTR (or DCD if the port is a DTE) EIA signal.

The **fill=< FLAG | MARK >** option indicates what kind of line fill should be applied between frames in the **HDLC** or **SDLC** protocols. Standard HDLC, and also standard SDLC, always have a **FLAG** fill. This is the default.

The **baud=<baud_rate>** determines the speed of the port. Synchronous DCE ports generate line clocking using this rate. Synchronous DTE ports derive their clocking from the attached device, but the baud rate specification is still required to allocate resources properly on the **T-40;** and should match the rate generated by the attached device.

For asynchronous ports, the allowed values are 75, 110, 150, 300, 600, 1200, 1800, 2400, 4800, 9600, 14400, 19200, 28800, 38400, 48000, 57600, 67200, 76800, and 115200.

For synchronous ports, the same rates apply up to and including 57600 (56K) baud. The default value is 9600. A special value “dt9001” (without quotes) should be entered if the port is being used to connect to a **DT-9001** telemetry adapter.

Please be aware that engineering rules apply for groups of ports regarding baud rates. See the addendum to this document on serial port baud rates that covers all the devices of the T-40 series.

The **pipeline=< #bytes | OFF >** option enables a pipeline for HDLC and SDLC ports where the transported protocol has small windows and very large frames. By default, the pipeline option is disabled. The pipeline should only be enabled only after consultation and protocol analysis to enhance the performance of the connection. The **#bytes** is the size of the frame at which pipelining is to occur. The value specified will be increased to the next multiple of sixteen. The value of **OFF** or **NONE** or **DISABLE** will disable the pipeline option.

The **dbits=<5|6|7|8>** option specifies the number of data bits in an asynchronous word. It excludes start, stop, and parity bits.

The **parity=<even|odd|none>** option specifies the parity of an asynchronous word.

The **stop=<1|1.5|2>** option determines the number of stop bits for asynchronous ports.

The **attn=<1BRK|2BRK|NONE|char>** sets the attention character. This is a character that when typed will interrupt the local session. The **1BRK** option specifies a single break. The **2BRK** option specifies two breaks within a short period. The **NONE** option specifies that no attention character is defined. Finally, any ASII character may be used as the attention. It should be entered in decimal ASCII representation.

The **flow=<XON|HW|none>** option determines the flow control for the port. The **XON** option uses XON/XOFF in-band flow control characters. The **HW** option uses the CTS and RTS leads for flow control. All flow control is disabled when the "**none"** option is used.

The **cug=[+|-]<CUG_num>** option allows the inclusion or deletion of a Closed User Group in the list of CUGs assigned to the user port. The "**+**" will add the **<CUG_num>** to the CUG list. The "**-**" is used to delete the **<CUG_num>** from the list.

The **crfix=< TRANS | NONULL >** option accommodates an anomaly in some early variants of telnet implementation on UNIX systems, which insert a NULL character in the data stream after a carriage return. Most end devices are not affected by this NULL character. However, some devices (e.g. the BNS control computer) have erroneous operation if these characters are received. The value **TRANS** indicates transparent operation, where all data received by the **T-40**, including a NULL after a carriage return, is forwarded to the end device. The value of **NONULL** removes a NULL character immediately following a carriage return. No other NULL characters are affected. The default operation is transparent, and the **crfix** option may only be specified if the protocol selected is asynchronous.

The **crlf=< TRANS | NOLF >** option is used to strip LF (line-feed) after CR (carriage return) in the asynchronous protocol.

The **PDDonCR=< ON | OFF >** option is used in conjunction with the **DEST**, and **DPORT** options to define a permanent destination which is not automatically dialed. The **T-40** will display a message that the user should enter a “carriage return”. Once entered, the permanent destination is defined. This option is used for a secure connection via a network security server. Please note that making the port permanently active with the **PAP** command will over-ride this feature.

The **rxidle=< OFF | <# Idle Minutes > >** option is used to establish an inactivity timer for the port in the **ingress** direction. That is, data being received from the user port and sent to the remote peer. The value of **OFF** disables the inactivity timer. The timer may have a value from one to 255 minutes when enabled. Should the inactivity timer elapse, the TCP connection will be terminated. The option is used to prevent inadvertent camping on the port.

The **txidle=< OFF | <# Idle Minutes > >** option is used to establish an inactivity timer for the port in the **egress** direction. That is, data being received from the remote peer and being sent to the user port. The value of **OFF** disables the inactivity timer. The timer may have a value from one to 255 minutes when enabled. Should the inactivity timer elapse, the TCP connection will be terminated. The option is used to prevent inadvertent camping on the port.

The **connbrk=< OFF | ON >** option is used to configure an asynchronous protocol port to send a BREAK indication to the attached device when a TCP is made to it. The value of **OFF** disables the function, and is the default. The value of **ON** enables the sending of the BREAK on each TCP connection. Additional breaks may always be sent using the standard telnet protocol encoding.

The **comment="User Comment"** option allows the administrator to post a note related to the user port. The string is double quoted, and may have any length up to sixteen characters between the quotes. Per Port comments can be changed even if the user ports are "in service".

The **moveto=<New Port Number>** option allows the administrator to move this configured port to another port number without re-entering the configuration. The original port number configuration is then deleted.

The **copyto=<Port Number Range>** option allows the administrator to replicate this port exactly on other ports. The **<Port Number Range>** may cross the port being replicated.

The **x25elm=< <Companion Port #> | NONE >]** option is available only when the port is of type **x25**. It allows two ports to be defined as a mutually exclusive set of interfaces. The option defines the operation of the link itself. The PAD and VC options are individual per port. For a true mutually exclusive redundant operation, these need to be set in hunt groups. See the configuration appendix on "Exclusive Link Mode Operation" for more information.

The **x25dxe=<DTE | DCE>** option is available only when the port is of type **x25**. It allows changing the logical sex of the interface. Each X.25 interface needs a single DTE and a single DCE. Normally, the network side is the DCE. For some network elements, the converse is true. An example is the LTS, and a #5ESS IOP.

The **x25win=<LAPB Tx Window>** option is available only when the port is of type **x25**. It allows changing the number of frames sent without acknowledgement. The default number is seven per the specification. The **<LAPB Tx Window>** may have a value of one through seven inclusive.

The **x25t1=<T1 Timer Value>** option is available only when the port is of type **x25**. It allows changing the X.25 LAPB T1 protocol timer.

The **x25n2=<N2 Retry Counter>** option is available only when the port is of type **x25**. It allows changing the number of retries at the LAPB layer for protocol operations.

The **x25t3=< #Seconds | DISABLE | DEFAULT >** option is available only when the port is of type **x25**. It allows changing, or disabling, the X.25 T3 timer. This timer controls the frequency of the IDLE RRs sent to the peer when the link is idle.

The **x25dar=< ON | OFF >** option is available only when the port is of type **x25**. When enabled, the **BX.25** link layer will be immediately restarted should the peer disconnect. When disabled, the **B)X.25** link layer remains in disconnect mode pending further action from the peer. The option was added for TR-TSY-000385 AMATPS interfaces.

The **x25pass=< OFF | DFLT | "Password String" >** option is available only when the port is of type **x25**. This option allows the setting of a **BX.25** I-Frame Password for the link. When set to **OFF**, the link does not issue nor does it expect an I-Frame Password. When the **DFLT** option is set, the TR-TSY-000385 AMATPS passwords are installed. Otherwise, a custom password may always be configured as a double quoted string. Specifics of this interface may be found in **BX.25** Issue 3.

The **x25xid=< XID Link ID >** option is available only when the port is of type **x25**. This option allows the setting of the XID link ID to be used when BX.25 I-Frame Passwords are exchanged. If the **x25pass** option is enabled and the **x25xid** has not been set, the default link id is 4. Specifics of this interface may be found in **BX.25** Issue 3.

The **vc=<Virtual Circuit Number>** is a modifier on the port number when the port is of type **x25**. It is required for configuration options that relate to an individual virtual circuit.

The **vcsvc=< PAD | PASS | RBP | MAC| ISO | SESS >** option determines the type of service for a virtual circuit. The VC must have been specified on the command

line. When set to the value of **PAD**, the virtual circuit is terminated in an X.3 PAD. When a value of **PASS** is selected, an X.25 pass-through service is selected. The latter is used for VC aggregation. When a value of **MAC** is selected, a special interface for the MacStar operation system is used. When a value of **RBP** is selected, the *Record Boundary Preservation* protocol is selected. The **ISO** value selects ISO X.25 used with FTAM implementations. The **SESS** value selects the (B)X.25 session layer interface.

The **AEP**, **AEPN**, **AEPX,** and **AEMLT** values are used for interworking with existing Applied Innovation equipment.

The **vcckt=< SVC | PVC >** option determines the operation of a virtual ciruit. When the **PVC** option is selected, connections will not generate call setup or call clear X.25 packets. However, the **T-40** will still respond to call setup and call clear packets generated by the attached device. When the **SVC** option is selected, a TCP connection to the virtual circuit will generate a call setup X.25 packet transaction. A disconnect will generate a call clear transaction. If the X.25 device clears the call, the TCP connection will also be dropped.

The **vctype=< ORIG | RCV >** option determines if a VC originates or receives an IP connection. The default is to receive an IP connection and establish an SVC. Only a VC with **vcckt=SVC** may be configured as originate. If the SVC is **vctype=ORIG**, the SVC mapping table is used to establish the IP connection upon receipt of a (B)X.25 call request packet.

The **vcwin=<VC Tx Window Size>** specifies the packet layer window size to be used for transmission purposes on the affected VCs. The valid values are one through seven inclusive. The VC must have been previously specified on the command line.

The **vcpkt=< 128 | 256 | 512 | 1024 >** specifies the packet size boundary upon which a packet is generated when the selected forwarding condition is not met. Any such packet will have the “More” bit set to indicate the transaction is not complete.

The **vcdbit=< ON | OFF >** specifies the option for the Delivery Confirmation (“D”) bit operation of the virtual circuit. When set to ON, the packets generated will have

the “D” bit encoded per the BX.25 specification. When set to OFF, the “D” bit will not be encoded. The default is the “D” bit not encoded.

The **pvcreset=<ON | OFF >** option specifies the operation of a PVC when a connection is made. When set to **ON**, the PVC is issued a RESET upon a user connection. When set to **OFF**, the PVC continues with it’s previous state. Some legacy devices cannot tolerate a PVC RESET and this option allows interoperability. The default is to have RESET enabled (ON).

The **pvcrstlnk=< OFF | CONSTDCD | SWDCD >** option specifies the operation of the link supporting the PVC when a connection is made. When set to any value other than **OFF**, the entire link is issued a RESTART upon a connection to the PVC. The PVC itself may also get a RESET depending on the setting of the **pvcreset** option. When set to **OFF**, the link behaves per the relevant (either **X.25** or **BX.25**) specification and no RESTART is issued at user connect. The **pvcrstlnk=SWDCD** option also switches the DCD lead as the BX.25 link layer is controlled. This yields a more effective simulation of a dynamic modem connection as is required by some legacy devices. Some switches (i.e. #5ESS) cannot have the DCD cycled as it will cause the link to not restart. The **pvcrstlnk=CONSTDCD** should be used in that situation as it will maintain the assertion of the DCD lead. The **pvcrstlnk** option is provided strictly for interoperability with select legacy devices. As a general rule, the **pvcrstlnk** feature should remain in the **OFF** condition unless specifically desired. The default is the **OFF** condition.

The **[vcpap=< LINKUP | ALWAYS >]** option operates on a VC in a similar manner to the Permanently Active (**PAP**) attribute of a serial port. Under normal circumstances, any TCP connection made to a VC’s TCP listen port is dropped immediately if the associated link is not active. This remains the default condition. The value of **LINKUP** to the **vcpap** option is this default condition. By setting the **vcpap=ALWAYS** option, the TCP is allowed to connect to the VC regardless of link state. Some operation systems prefer such operation. When configured as such, the verify for the VC will show “w/PAP” on the connection line. In the default condition, a TCP disconnect is noted on the snooper output for the virtual circuit if enabled.

The **svctclass=< NONE | Throughput >** option specifies a throughput class declared on X.25 call connect, and call accept packets. The throughput class is the same in both transmit and receive directions. As a general rule, it should always be set to **NONE** such that no limiting throughput class is established. All specification

allowable values for throughput class are supported. These range from 75bps to 48000bps inclusive. The option is provided for interface to devices that require a throughput class to be explicitly negotiated.

The **svcfac=< AUTO | FORCED >** option specifies the population of the facilities options in an SVC call setup packet. Normally, the facilities are only populated when a service class is defined, or if extended RFC1006 address is utilized. The default is **AUTO** that utilizes this operation. The **FORCED** option emits the facilities on every SVC call setup regardless of other configuration.

The **padecho=< ON | OFF >** refers to reference #2 in the X.3 parameter list. When set to **OFF**, the PAD will not echo characters back to the IP endpoint. When set to the value of **ON**, all characters are to be echoed back to the IP source.

The **paderase=< NONE | BS | <HEX BYTE> >** option specifies reference #16 in the X.3 parameter list. It is used with manual telnet connections to an X.25 VC. It sets the buffer editing “erase” character. When the special “erase” character is received by the X25PAD for a specific virtual circuit, the previous character in the packet accumulation buffer is deleted. If the **padecho** option was also enabled, a “Backspace Blank Backspace” sequence is emitted to the user. When the **paderase** option is set to NONE, the PAD will not have a special “erase” character. When the value is BS, it is set to the ASCII backspace character 0x08. Otherwise, any character may be entered as a hexadecimal byte in 0xXX notation. This option is only valid on X.25 virtual circuits configured with the PAD interface.

The **padfwd=<NONE | CR | CRDROP | SEMI | EXCL | ALL | GRPx>** option specifies reference #3 of the X.3 parameter list. This is the forwarding condition (outside the PAD timer) which will forward data towards the X.25 virtual circuit. A value of **NONE** indicates that there are no character forwarding conditions. A value of **CR** indicates that a carriage return will forward any accumulated data (including the carriage return). A value of **CRDROP** indicates that a carriage return will forward any accumulated data (but not including the carriage return). A value of **SEMI** indicates that a semicolon will forward any accumulated data including the semicolon. A value of **EXCL** indicates that an exclamation mark will forward any accumulated data including the exclamation mark. A value of **ALL** indicates that all data is to be forwarded immediately. The **ALL** option has the effect of generating single user character X.25 packets on this virtual circuit. The **GRPx** values specify selected groups of forwarding characters. **GRP1** forwards on ESC, BEL, ENQ, and

NAK. **GRP2** forwards on DEL, CAN, DC2. **GRP3** forwards on ETX, EOT. **GRP4** forwards on HT, LF, VT, and FF. Multiple forwarding conditions are allowed simultaneously. Setting **padfwd** to a value aggregates with the previous value of **padfwd**. The **padfwd=none** is required to clear the forwarding conditions.

The **padidle=<#X.3 ticks>** parameter refers to reference #4 of the X.3 parameter list. This is the time forwarding condition. When it expires, it will forward any data collected to the X.25 circuit. The timer is reset to the specified timer value whenever a forwarding condition is reached. The value is based on ticks of 1/20th of a second each per the X.3 specification.

The **padbreak=< NONE | INTR | RESET | BRKIND >** parameter refers to reference #7 of the X.3 parameter list. This is the action to be taken when a break indication (a standard Telnet encapsulated value) is received from the remote IP endpoint. A value of **NONE** will ignore the break, and it is deleted from the data stream. The value of INTR will generate an X.25 interrupt packet. The value of **RESET** will generate an X.25 virtual circuit . The value of **BRKIND** will generate an X.29 “indication of break” message on the X.25 virtual circuit.

The **padparity=< TRANS | EVEN | ODD >** parameter is not present in the X.3 parameter list. It allows special parity treatment for interface to network elements that require parity. The default value is transparent operation. The value of **TRANS** sets the operation to be transparent. When the parity treatment is transparent, the data is not modified in either direction. The value of **EVEN** sets the operation to be even parity towards the (B)X.25 device, and stripped parity towards the TELNET. The value of **ODD** sets the operation to be odd parity towards the (B)X.25 device, and stripped parity towards the TELNET.

The **padcrlf=<NONE | RMT | VC | BOTH>** parameter refers to reference #13 of the X.3 parameter list. This is the action to be taken when a CR is received in the data stream from the remote IP endpoint. A value of **NONE** indicates that there is to be no LF (line feed) insertion. A value of **RMT** will insert an LF following a CR whenever it is sent towards the remote IP endpoint. A value of **VC** will insert an LF following a CR whenever it is sent towards the X.25 virtual circuit. A value of **BOTH** will insert an LF following a CR in either direction.

The **padfilter=<NONE | PRINTABLE >** parameter enables a data filter. The default is **NONE** and implies transparent operation. When set to **PRINTABLE**, only characters that are printable, CR, and LF are allowed towards the VC. All data received from the VC remains transparent with either option.

The **padhdx=< DISABLE | ENABLE >** parameter allows control over telnet options when the Telnet API is used with the PAD. The normal operation is **DISABLE**. When enabled, the peer telnet client is forced into HDX mode. Some operations systems require those options to work properly. The value of **OFF** is an alternate for **DISABLE**. The value of **ON** is an alternate for **ENABLE**.

The **padcmap=< ON | OFF >** option provides the automatic case mapping from lower case to upper case. When the option is set to **ON**, all lower case characters are automatically converted to upper case. When **OFF**, no transformations are performed.

The **padapi=< TELNET | RAW >** option provides a means of selecting the PAD virtual circuit to use **raw** protocol. The **raw** protocol is essentially asynchronous, but without the benefit of Telnet RFC encapsulation. It is used for applications that do not implement the Telnet RFC. The default for this option is to use the Telnet encapsulation.

The **padcug=[+|-]<CUG Number>** parameter allows the virtual circuit connection to be protected by closed user group membership. The closed user group feature is significant only for PAD service. The closed user group address entries are defined with the **cug** command. Any or all closed user group entries may be assigned with a virtual circuit.

The **calling=<DNIC+NTN>** parameter is used to specify the “calling address” on an SVC call setup packet. Most devices do not require a calling address. This option allows the specification for a device which does require same. The fixed value of **DELETE** will remove any configured address.

The **called=<DNIC+NTN>** parameter is used to specify the “called address” on an SVC call setup packet. Most devices do not require a called address. This option

allows the specification for a device that does require same. The fixed value of **DELETE** will remove any configured address.

The **ext_calling=<OSI NSAP>** parameter is used to specify the "extension calling address" on the SVC call setup packet of an OSI X.25 connection. The option may be deleted with the value 'delete'. This parameter is only required with the OSI X.25 interface. The fixed value of **DELETE** will remove any configured address.

The **ext_called=<OSI NSAP>** parameter is used to specify the "extension called address" on the SVC call setup packet of an OSI X.25 connection. The option may be deleted with the value 'delete'. This parameter is only required wit the OSI X.25 interface. The fixed value of **DELETE** will remove any configured address.

The **ulen=< UDATA Length >** parameter specifies the length of the user data field to be used in an SVC call setup packet. The default is one byte of value 0xC1.

The **udata#=< Hex Byte >** parameter allows modification of the user data field to be used in an SVC call setup packet. The **#** may be a number in the range of one through sixteen. The **< Hex Byte >** is of the form 0xXX.

The **vccom="User Comment"** parameter allows the specification of a comment line for the one or more VCs. The comment may be up to 32 characters in length, and may contain spaces and some special characters. It may not contain an embedded double quote. Comments are allowed in upper and lower case and may be changed with the port in service. Once entered, the comments are displayed on the port verify.

3.35.2 REMOVE PORT

Syntax: remove port < portnum > < all > < range >

This command takes a user port out of service, and must be performed before any port-level configuration changes can occur. The **<PortNum>** parameter may be a number in the range 1 through the number of ports on the **T-40**. The **<all>** parameter removes all the serial ports. The **<range>** parameter removes a sequential range of ports.

3.35.3 RESTORE PORT

Syntax: restore port < portnum > < all > < range >

This command returns a user port to service.

The **<PortNum>** parameter may be a number in the range of 1 through the number of serial ports on the **T-40**. The **<all>** parameter restores all the ports. The **<range>** parameter restores a sequential range of ports.

3.35.4 DISPLAY PORT MEASUREMENTS

Syntax: dmeas port < portnum | all | range >

The **dmeas (dm) port** command displays the current port-level measurements for the RS-232C port specified by **<portnum>**, in a formatted report on the console. The **<portnum>** parameter may be a number in the range 1 through the number of ports on the **T-40**. The **<all>** parameter will display the measurements on all ports. The **<range>** parameter is in the form of "start-end", and will display the measurements of the ports in that sequential range inclusive.

3.35.5 VERIFY PORT

Syntax: vfy port < portnum | all |range > [<vc range>]

This command displays the configuration of the port number specified. The **<portnum>** parameter may be a number in the range 1 through the number of ports on the **T-40**. The **<all>** parameter will verify all ports. The **<range>** parameter will verify a sequential range of ports.

If the optional **[<vc range>]** argument is present, any ports within the port range that are configured as X.25 will also display the virtual circuits specified by that argument.

3.35.6 VERIFY VIRTUAL CIRCUIT

Syntax: vfy vc < portnum > <vc range>

This command displays the configuration of the X.25 virtual circuits on the port number specified. The **<portnum>** parameter may be a number in the range 1 through the number of ports on the **T-40**. The port must be configured for X.25 or the command will fail. The value of **all** in the **<vc range>** parameter will display the configuration of all virtual circuits for the port.

3.35.7 DISPLAY PORT STATUS

Syntax: dstat port < < portnum > | < all > | < range > > [<vc range>]

This command displays the status of the port number specified. The **<portnum>** parameter may be a number in the range 1 through the number of ports on the **T-40**. The **<all>** parameter will display the status of all ports. The **<range>** parameter is in the form of "start-end", and will display the status of the ports in that sequential range inclusive.

If the optional **[<vc range>]** argument is present, any ports within the port range that are configured as X.25 will also display the virtual circuits specified by that argument.

3.35.8 DISPLAY CONNECTIONS

Syntax dconn < <Port# Range> | ALL >

The **dconn** command command displays the connections between user ports and their destinations. The service state of all ports currently 'In Service' are displayed. For X.25 ports, the connection state of the virtual circuits are displayed. The **dconn** command takes one argument to limit the report size. The argument may be the port number, a range of port numbers, or the value of **ALL** to specify all connections.

3.35.9 DIAGNOSE USER PORT

Syntax: diag port < portnum > < int | ext | all >

The **diagnose (diag)** command command accepts arguments to specify a user port on which to perform diagnostics. Two types of diagnostics are available. The internal port diagnostic checks the operation of the hardware exclusive of the cabling, connectors, and drivers. The external port diagnostic checks the operation of everything, including the attached cable. The port ***must*** be out of service to diagnose.

The **<port_num>** parameter specifies the RS-232C user port. The diagnostic type is either **INT** for the internal test, **EXT** for the external test, or **ALL** for both the internal and external tests.

3.35.10 X.25, LAPB, & SLM Protocol Analyzer Snooper

Syntax: snoop <X.25, LAPB, or SLM Port #> <L2 | OFF | <VC Range>> [verbose]

The **snoop** command is only available to X.25 and SLM (B)X.25 ports. It implements the X.25 protocol analyzer. The **snoop** command may be invoked multiple times with the results aggregating.

The timestamp used on snooper output will be the NTP time if an NTP server is defined and active. Or, it may be a relative time if no NTP operations are taking place. The relative time is set to zero when the first **snoop** command is invoked from any User and on any console. Multiple consoles may request the exact same snooper output.

The **<x.25 or SLM Port #>** is the number of the port to be snooped. The port must be of either **type=x25**, **type=LAPB**, or **type=SLM**. The parameter of **L2** will select snooping at the LAPB layer. Both transmit and receive directions will be displayed. The parameter of **<VC Range>** allows the specification of one or many virtual circuits on the port. This snooping is performed at the packet layer.

Normally, the packet control and size is displayed in short format. If all of the bytes in the packet are desired, the **[verbose]** option may be specified.

In order to disable snooping on one or more components of an X.25 port, the **OFF** option is specified. The **OFF** parameter will disable snooping at all levels on the specified X.25 port.

3.35.11 Serial Port Snooper

Syntax: snoop <Port #> < ON | OFF > [verbose]

The **snoop** command is available to snoop ports with protocols that are not terminating vertical protocol stacks. The terminating protocol stacks have their own unique snooper.

The output of the serial port snooper is displayed both in ascii and hexadecimal format. The **snoop** command may be invoked multiple times with the results aggregating.

The timestamp used on snooper output will be the NTP time if an NTP server is defined and active. Or, it may be a relative time if no NTP operations are taking place. The relative time is set to zero when the first **snoop** command is invoked from any User and on any console. Multiple consoles may request the exact same snooper output.

The **<Port#>** is the number of the port to be snooped. The port must be a port with a protocol that currently supports the snooper.

In order to disable snooping of a port, the **OFF** option is specified.

3.35.12 CONFIGURING THE USER PROMPT

Syntax: uprompt <Port #> ["User Prompt" | STD]

The **uprompt** command command supports custom user prompting for ports of **type=orig**.

In the default condition, a user is prompted with a **T-40 Destination>** prompt string where **T-40** is the actual device number. If the **uprompt** command is issued with a double quoted string, that string is presented as the user prompt without the double quotes.

The maximum size of the prompt string is 31 characters. The value of **STD** returns the **T-40** user prompt to its default, or standard, configuration.

Each port may have a different prompt sequence in the **T-40**. The **<Port #>** specifies which port this particular prompt is to be issued.

4 SNMP

The SNMP V1 agent supports a multitude of SNMP MIB variables, SNMP *Traps*, and *Set* and *Get* operations.

4.1 SNMP Version 1 Commands

Command	Operational Result
Get	Requests the values of one or more Management Information Base (MIB) variables.
GetNext	Enables MIB variables to be read sequentially, one variable at a time.
Set	Permits one or more MIB values to be updated.
GetResponse	Used to respond to a Get, GetNext, or Set.
Trap	Indicates the occurrence of a predefined condition.

4.2 SNMP STANDARD MIB VARIABLES

RO = Read-Only Variable
R/W = Read/Write Variable
SIV = Storage is Volatile

MIB Variable Number	Name	MIB	Console Equivalent	Access	Notes
1.3.6.1.2.1.1.1.0	SysDescr	MIB-II	Banner Message	RO	
1.3.6.1.2.1.1.2.0	SysObjectID	MIB-II	None	RO	
1.3.6.1.2.1.1.3.0	SysUpTime	MIB-II	None	RO	
1.3.6.1.2.1.1.4.0	SysContact	MIB-II	None	R/W	SIV
1.3.6.1.2.1.1.5.0	SysName	MIB-II	None	R/W	SIV
1.3.6.1.2.1.1.6.0	SysLocation	MIB-II	None	R/W	SIV
1.3.6.1.2.1.1.7.0	SysServices	MIB-II	None	RO	
1.3.6.1.2.1.4.1.0	IpForwarding	MIB-II	None	RO	
1.3.6.1.2.1.4.2.0	IpDefaultTTL	MIB-II	None	RO	
1.3.6.1.2.1.4.3.0	IpInReceives	MIB-II	Number of Ethernet Pkts Rcvd	RO	
1.3.6.1.2.1.4.4.0	IpInHdrErrors	MIB-II	Nbr of Packets w/Header Errs	RO	
1.3.6.1.2.1.4.5.0	IpInAddrErrors	MIB-II	Nbr Rx Packets w/Wrong Addr	RO	
1.3.6.1.2.1.4.6.0	IpForwDatagrams	MIB-II	None	RO	
1.3.6.1.2.1.4.7.0	IpInUnknownProtos	MIB-II	Nbr of Packets w/Unk Protocol	RO	
1.3.6.1.2.1.4.8.0	IpInDiscards	MIB-II	Nbr of Packets Disc due to Resource	RO	
1.3.6.1.2.1.4.9.0	IpInDelivers	MIB-II	Inferred from DMEAS counters	RO	
1.3.6.1.2.1.4.10.0	IpOutRequests	MIB-II	Number of Device Frames Transmitted	RO	
1.3.6.1.2.1.4.11.0	IpOutDiscards	MIB-II	Nbr of Port frames Disc due to Resource	RO	
1.3.6.1.2.1.4.12.0	IpOutNoRoutes	MIB-II	None	RO	
1.3.6.1.2.1.4.13.0	IpReasmTimeout	MIB-II	None	RO	
1.3.6.1.2.1.4.14.0	IpReasmReqds	MIB-II	None	RO	
1.3.6.1.2.1.4.15.0	IpReasmOKs	MIB-II	None	RO	
1.3.6.1.2.1.4.16.0	IpReasmFails	MIB-II	None	RO	
1.3.6.1.2.1.4.17.0	IpFragOKs	MIB-II	None	RO	

1.3.6.1.2.1.4.18.0	IpFragFails	MIB-II	None	RO	
1.3.6.1.2.1.4.19.0	IpFragCreates	MIB-II	None	RO	
1.3.6.1.2.1.4.21.0	IpRoutingDiscards	MIB-II	None	RO	
1.3.6.1.2.1.5.1.0	IcmpInMsgs	MIB-II	None	RO	
1.3.6.1.2.1.5.2.0	IcmpInErrors	MIB-II	ICMP Errors	RO	
1.3.6.1.2.1.5.3.0	IcmpInDestUnreach	MIB-II	None	RO	
1.3.6.1.2.1.5.8.0	IcmpInEchos	MIB-II	Nbr of Pings	RO	
1.3.6.1.2.1.5.9.0	IcmpInEchoReps	MIB-II	None	RO	
1.3.6.1.2.1.6.1.0	TcpRtoAlgorithm	MIB-II	None	RO	
1.3.6.1.2.1.6.2.0	TcpRtoMin	MIB-II	None	RO	
1.3.6.1.2.1.6.3.0	TcpRtoMax	MIB-II	None	RO	
1.3.6.1.2.1.6.4.0	TcpMaxConn	MIB-II	None	RO	
1.3.6.1.2.1.6.5.0	TcpActiveOpens	MIB-II	None	RO	
1.3.6.1.2.1.6.6.0	TcpPassiveOpens	MIB-II	None	RO	
1.3.6.1.2.1.6.7.0	TcpAttemptFails	MIB-II	None	RO	
1.3.6.1.2.1.6.8.0	TcpEstabResets	MIB-II	None	RO	
1.3.6.1.2.1.6.9.0	TcpCurrEstab	MIB-II	None	RO	
1.3.6.1.2.1.6.10.0	TcpInSegs	MIB-II	None	RO	
1.3.6.1.2.1.6.11.0	TcpOutSegs	MIB-II	None	RO	
1.3.6.1.2.1.6.12.0	TcpRetransSegs	MIB-II	None	RO	
1.3.6.1.2.1.6.13.X	TcpConnTable Entries	MIB-II	None	RO	
1.3.6.1.2.1.6.14.0	TcpInErrs	MIB-II	None	RO	
1.3.6.1.2.1.6.15.0	TcpOutRsts	MIB-II	None	RO	
1.3.6.1.2.1.7.1.0	UdpInDatagrams	MIB-II	Derived from other Counts.	RO	
1.3.6.1.2.1.7.2.0	UdpNoPorts	MIB-II	Non-Peer and Spurious UDP errors	RO	
1.3.6.1.2.1.7.3.0	UdpInErrors	MIB-II	Frame Errors	RO	
1.3.6.1.2.1.7.4.0	UdpOutDatagrams	MIB-II	Frames Sent, Keep Alive Messages sent, etc.	RO	
1.3.6.1.2.1.7.5.X	udpEntry Table	MIB-II	None	RO	
1.3.6.1.2.1.11.1.0	SnmpInPkts	MIB-II	None	RO	
1.3.6.1.2.1.11.3.0	SnmpInBadVersions	MIB-II	None	RO	

1.3.6.1.2.1.11.4.0	SnmpInBadCommunityNames	MIB-II	None	RO	
1.3.6.1.2.1.11.5.0	SnmpInBadCommunityUses	MIB-II	None	RO	
1.3.6.1.2.1.11.6.0	SnmpInASNParseErrs	MIB-II	None	RO	
1.3.6.1.2.1.11.30.0	SnmpEnableAuthenTraps	MIB-II	None	R/W	SIV
1.3.6.1.2.1.11.31.0	SnmpSilentDrops	MIB-II	None	RO	
1.3.6.1.2.1.11.32.0	SnmpProxyDrops	MIB-II	None	RO	

4.3 SNMP PRIVATE MIB VARIABLES

The following is a limited private MIB for the T-40 series of devices. It is an addition to the standard MIB variables.

```
T40-MIB { iso org(3) dod(6) internet(1) private(4) enterprises(1)
3791 }

DEFINITIONS ::= BEGIN

IMPORTS
      enterprises
            FROM RFC1155-SMI

      OBJECT-TYPE
            FROM RFC-1212

      DisplayString
            FROM RFC1213;

telecomp    OBJECT IDENTIFIER ::= { enterprises 3791 }

products    OBJECT IDENTIFIER ::= { telecomp 1 }

t40series   OBJECT IDENTIFIER ::= { products 1 }

NumPhyPort  OBJECT-TYPE
            SYNTAX INTEGER
            ACCESS read-only
            STATUS mandatory
            DESCRIPTION
                "The number of physical ports present on this T-40
```

```
series implementation."
            ::= { t40series 1 }


PhyPortStat OBJECT-TYPE
            SYNTAX DisplayString (SIZE (0..40))
            ACCESS read-only
            STATUS mandatory
            DESCRIPTION
                 "A string of characters, one per port, indicating
physical port status."
            ::= { t40series 2 }


            END
```

The **NumPhyPort** is the number of physical ports on the T-40 series device. It will be 1 for a T-40S, 4 for a T-40L, and 40 for a T-40.

The **NumPhyPort** may be retrieved by the following standard UNIX command if an SNMP manager is not to be used.

snmpget -v1 -c ${COMM} -Ov ${IPADDR} 1.3.6.1.4.1.3791.1.1.1.0

Where ${COMM} is the snmp community to be used for the exchange and is usually public. It may be configured on the T-40 to a unique value if desired. The ${IPADDR} is the IP address of the T-40.

Each character in the **PhyPortStat** is ASCII encoded hexadecimal with the four bits represented by the character in the form:

< Link Status Valid > < Link Status > < Ingress EIA > < Service State >

The < Service State > bit will be zero if the port is 'Out of Service', and one if the port is 'In Service'. The other bits are only valid if the port is 'In service'.

The <Ingress EIA> is the DTR or DCD lead input to the T-40. This will be dependent on the configuration of the port cabling. A value of zero implies that the ingress EIA lead is de-asserted. A value of one implies that the ingress EIA lead is asserted.

The <Link Status> bit is only relevant for ports that are configured for a protocol that has a link layer. An example is X.25. The <Link Status> bit will be zero if the link is not active, and one if the link is active.

The <Link Status Valid > bit indicates whether the <Link Status> bit is relevant. It will be zero if the port is configured where there is no link status; and one if the port is configured where there is a link status.

The theoretical valid values of **PhyPortStat** are ASCII 0 – 9, and A – F. However, there will be some impossible combinations so not all values will be emitted.

The **PhyPortStat** may be retrieved by the following standard UNIX command if an SNMP manager is not to be used.

snmpget -v1 -c ${COMM} -Ov ${IPADDR} 1.3.6.1.4.1.3791.1.1.2.0

Where ${COMM} is the snmp community to be used for the exchange and is usually public. It may be configured on the T-40 to a unique value if desired. The ${IPADDR} is the IP address of the **T-40**.

Each character in the **ScanPtStat** is a printable ASCII encoding of five bits with an indication of relevance. The five bits are as follows:

< Scan Pt. E > < Scan Pt. D > < Scan Pt. C > < Scan Pt. B > < Scan Pt. A >

Since the number of bits needed exceeds the printable ASCII encoding with a single character, an extended encoding is used. If the port is not configured as discrete, the encoded value will be "." That will indicate that scan

points are not valid on this port. If the port is configured as discrete, the five scan points are encoded in extended encoding with possible values of ASCII “0” – “9”, and ASCII “A” – “V”. The value of ASCII “0” indicates all bits de-asserted, and the value of ASCII “V” indicates all bits asserted.

Please note that the T-40S and T-40L support five scan points per port. The T-40 has RJ45 based serial ports and therefore support three scan points per port.

The **ScanPtStat** may be retrieved by the following standard UNIX command if an SNMP manager is not to be used.

snmpget -v1 -c ${COMM} -Ov ${IPADDR} 1.3.6.1.4.1.3791.1.1.3.0

Where ${COMM} is the snmp community to be used for the exchange and is usually public. It may be configured on the T-40 to a unique value if desired. The ${IPADDR} is the IP address of the **T-40**.

4.4 SUPPORTED TRAPS

Alarm Text	Severity	Trap Type	Notes
None	N/A	ColdStart	Generated when the unit starts up
None	N/A	AuthFail	SNMP Authorization Failure

5 ALARMS

The following table lists alarm types generated by the **T-40**. Alarms are visible at the console and via StarKeeper® II NMS.

Alarm	Severity
LAN Link is Down	MAJOR
LAN Link is Up at 10Mbps.	INFO
LAN Link is Up at 100Mbps.	INFO
User Requested Reboot in Progress	INFO
Invalid Login Attempt.	MINOR
Invalid Password Change Attempt.	MINOR
SNMP Trap Manager not reachable (ICMP).	INFO
ICMP Destination Unreachable Msg Received.	MINOR
Port <#> received a call from <IPv4 or IPv6 address> outside CUG list.	MINOR
Serial Number is not valid. Module defective.	MAJOR
Console session in-activity timeout.	INFO
Password Reset Attempt Failed.	MINOR
User Port XX disconnected. Half Open TCP error.	INFO
Duplicate IP address @ MAC XXX.XXX.XXX.XXX.XXX.XXX	MAJOR
Insufficient Administrative Authority	MINOR
Installation Attempt Failed.	MINOR
The database is being automatically converted.	INFO
Warning: Database appears corrupted. Repair Attempted.	MAJOR
Warning: Database is corrupted. Not Repairable.	MAJOR

5.1 MAJOR ALARMS

A major alarm indicates a serious, service-degrading condition.

5.2 MINOR ALARMS

A minor alarm indicates a secondary or transient error that is not likely to affect overall service unless multiple minor alarms are issued. In this case, a serious condition exists that may affect overall system performance.

5.3 INFO ALARMS

An information alarm is a message that does not necessarily require attention. It typically is important for network administration, but does not adversely affect service.

6 MODULE MEASUREMENTS

This appendix itemizes the measurements available using the display measurements (**dm**) command with the **mod** option. These are unit-level measurements. The base measurements are always displayed; the error and exception counters are only displayed if nonzero.

Interface	Type	Protocol	Description
LAN	Base	All	Number of LAN Packets Received
LAN	Base	All	Number of LAN Packets Transmitted.
LAN	Except	All	Number of ICMP Echo Requests Received.
LAN	Error	All	Number of Ethernet Discards (Resource).
LAN	Error	All	Number of Late Collisions (TX).
LAN	Error	All	Number of Under-run. (TX).
LAN	Error	All	Number of packets which exceeded the Retry Limit (TX).
LAN	Error	All	Number of Carrier Sense Lost (TX).
LAN	Error	All	Number of Frame Collisions (RX).
LAN	Error	All	Number of Receiver Overruns (RX).
LAN	Error	All	Number of Receive CRC Errors. (RX).
LAN	Error	All	Number of Short Frame Errors. (RX).
LAN	Error	All	Number of Non-Aligned Frame Error. (RX).
LAN	Error	All	Number of Frame Length Violations. (RX).
LAN	Error	All	Number of Unsupported Protocol Frames. (RX).
LAN	Error	All	Number of Invalid UDP frames. (RX).
LAN	Error	All	Number of Rx Frames w/IP Header Checksum Errors. (RX).

LAN	Error	All	Number of Rx Frames w/ICMP Checksum Errors. (RX).
LAN	Error	All	Number of ICMP Unreachable Destination Messages (RX).
LAN	Error	IP-DSU	Number of Rx Frames from Non-Peer Entity.
LAN	Error	All	Number of Unknown ICMP Messages. (RX).
LAN	Error	IP-DSU	Number of Packets lost from TTL Network Error. (RX).
LAN	Error	All	Number of Packets with wrong IP Destination Address (RX).
LAN	Error	All	Number of Rx Packets with Unknown ARP Operations. (RX).
LAN	Error	All	Number of Bad ARP Reply Packets Received.
LAN	Error	All	Number of RFC894 Packets with an Unknown protocol type field. (RX).
LAN	Error	All	Number of 802.3 Frames with an Unknown protocol type field. (RX).
LAN	Error	SNMP	Number of SNMP Packets Received outside CUG (RX).

7 USER PORT MEASUREMENTS

This appendix itemizes the measurements available using the display measurements (**dm**) command with the **port** option. These are user-port-level measurements.

Protocol	**Description**
ALL	Number of Bytes Received
All except Asynchronous	Number of Frames Received
ALL	Number of Bytes Sent
All except Asynchronous	Number of Frames Sent

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10 AUTHOR

Comments and Questions regarding this document or the products covered within this document should be addressed to the author.

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Name:

banner – Configure Banner Messages.

Synopsis:

banner [PRE] [CLEAR] [L#=”Banner Line”]
[POST] [CLEAR] [L#=”Banner Line”]
[VFY]

Description:

The **banner** command is used to define the messages that are displayed at user login. There are two such banner messages. Neither is required and will not be displayed if no lines are defined. The pre-login message is issued at the moment of connection to a network console. The post-login message is issued after a successful login to the device.

Options:

The **[PRE]** specifies that the rest of the command applies to the pre-login banner message.

The **[POST]** specifies that the rest of the command applies to the post-login banner message. This is the default if **[PRE]** nor **[POST]** is specified.

The **[CLEAR]** specifies that the specified banner is to be deleted entirely.

The **[L#=”Banner Line”]** specifies the banner line where # is a number between one and twenty four. The line must be double quoted and is limited to 80 characters.

Examples:

banner pre clear
banner pre L1=" Maintained by the trolls under the bridge. 1-800-555-1212"
banner pre L2="Project X authentication is required."

This banner will display these two lines after the connection ID and before requesting a User ID and Password. It is the pre-login banner. Notice that banner messages do not need to be enabled or placed into service. They are used if they are defined, and not used if undefined. Up to 24 lines are available.

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Copyright:

Name:

cmdlvl – Configure Command Administrative Levels.

Synopsis:

cmdlvl < **<Command>** | **ALL** | **DISPLAY** >
[**<Level>** | **DEFAULT**]
[**<Alias>**]

Description:

The **cmdlvl** command administers the permissions required for each **T-40** Command. This command is only available to the master administrator user id ("**admin**").

The first argument **<Command>** is either the command to administer, the value of **ALL** representing all commands, or the value of **DISPLAY** to indicate a report of the configuration is desired. The **<Command>** may be a standard abbreviation. For example, **remove** and **rm** refer to the same command.

The second argument is not required for a **DISPLAY** operation. It specifies the administrative level **<Level>** to be assigned to the commands. If the keyword **DEFAULT** is used, then it is the **T-40** default value for each command specified. The valid levels are:

- **MAO** – Master Administrator Only
- **ADM4** – Administrative level 4.
- **ADM3** - Administrative level 3.
- **ADM2** – Administrative level 2.
- **ADM1** – Administrative level 1.
- **GEN** – General User.

Please be aware that the value of **MAO** cannot be assigned to a configured user (see **user** command). It is only applicable to the Master Administrator **admin**.

The third, optional, argument is an **<Alias>** and allows the command to have an alternate name. The **<Alias>** is only to be used for command decode. Any help messages would refer to the standard name. A duplicate with another **<Alias>,** standard

command names, or standard command abbreviations, are not allowed. An **<Alias>** may be up to 15 characters in length using only lower case letters and numbers.

Examples:

cmdlvl all default
cmdlvl ntp adm3
cmdlvl vfy default show
cmdlvl display

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Copyright:

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Console – Configure Administrative Consoles.

Synopsis:

con < Console ID > [type=< TELNET | SSH >]
[phy=< LAN1 | LAN2 | ANY >]
[port=< TCP Port# >]
[label=< <Double Quoted String> | NONE >]
[cug=[+|-]<CUG Number>]
[aaa=< TAC | RAD | NONE >]

Description:

The **console** command is used to define options for any of the consoles. The serial console has a **<Console ID>** of **SER**. The eight network consoles have a **<Console ID>** of **NET1** through **NET8** inclusive. Only the label is changeable on the serial console.

Options:

The **[type=< TELNET | SSH >]** specifies the protocol suite for transport. The **TELNET** protocol is the default.

The **[phy=< LAN1 | LAN2 | ANY >]** specifies the interface the network console is to use. The option is not valid for the serial console. If a value of **LAN1** is used, the network console will only be available on the **LAN1** interface. If a value of **LAN2** is used, the network console will only be available on the **LAN2** interface. If the console is desired on either LAN interface, the value of **ANY** will achieve that result.

The **[port=<TCP Port #>]** option specifies the TCP port that the network console is to use. If multiple consoles are to be placed into a hunt group, all that is needed is to give the same TCP port number to each.

The **[label=< "Double Quoted String" | NONE]** defines a label to use with the console. Each console may have a different label. This option is valid for the serial console. This is useful for fragmenting a **T-40** across organizations or users. The value of **NONE** deletes any current label assigned to the console. The label to be assigned is a double quoted string. The console label may be up to 31 characters in length.

The **[cug=[+|-]<CUG Number>]** option allows the assignment of a closed user group to each network console. The **< CUG Number >** is the closed user group identifier as defined with the **cug** command. A prefix of **+** will add the **<CUG Number>** to the list associated with the telnet console. A prefix of **–** will delete the **<CUG Number>** from the list associated with the console.

The **[aaa=< TAC | RAD | NONE >]** specifies if the console will use an authentication server. The default is for both TACACS+ and RADIUS to be enabled. Setting aaa=NONE disables both types of authentication servers. Setting aaa=TAC enables TACACS+, and setting aaa=RAD enables RADIUS. The operations are cumulative.

Setting the key to NONE uses clear text instead of encrypted transport. Configure the key to match the server being used.

Examples:

con 3 type=ssh phy=any port=1022 cug=+7 cug=+9 aaa=tac aaa=rad

The command above configures console #3 for SSH transport at TCP port 1022 on either network. It enables both TACACS+ and RADIUS server authentication if they are defined and enabled. Further, it associates the console with Closed User Groups #7 and #9. See the AAA application note for more details.

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E2Amap – E2A Head of Bus → E2A address and timeout map operations.

Synopsis:

E2Amap < Port# > [ADDR | TIME | CLEAR]

Description:

The **E2Amap** command displays, or clears, the dynamic E2A mapping created by the E2A Head of Bus (**E2AHOB**) operation.

A parameter of **ADDR** will display the address map. All 256 possible E2A addresses are displayed in a grid. An E2A address in use used will have the E2A remote path ID in the cell for that E2A address.

A parameter of **TIME** will display the timeout map. All 256 possible E2A addresses are displayed in a grid. An E2A address with timeout will have the E2A remote path ID in the cell for that E2A address.

A parameter of **CLEAR** will clear both the E2A address, and the E2A timeout maps. The **E2AHOB** will dynamically reconstruct the maps during subsequent operation.

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Copyright:

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lldp – Link Layer Discovery Protocol

Synopsis:

lldp [interval=< # Interval Seconds >]
[VFY]
[ENABLE]
[DISABLE]

Description:

The **lldp** command is used to administer the operation of the **T-40** to emit link layer discovery protocol PDUs on the local LAN segment.

The link layer discovery protocol is an IEEE equivalent to the Cisco discovery protocol (CDP). It is used by some network equipment to identify other devices on the same LAN segment. The required MAC address associated with LLDP PDUs is not forwarded by an ether switch, nor is it propagated with via a router. Therefore, it is only visible on the specific LAN segment on which the T-40 resides.

Options:

The **[interval=< # Interval Seconds >]** specifies the frequency of the LLDP PDUs being emitted.

The **[DISABLE]** specifies that the LLDP PDU generation of the **T-40** is not to be utilized.

The **[ENABLE]** specifies that the LLDP PDU generation of the **T-40** is to be utilized.

Examples:

```
lldp interval=90
lldp enable
lldp vfy
```

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Copyright:

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mec – Malicious Entity Control.

Synopsis:

mec [threshold=<#>]
[decay=<#>]
[DISABLE] [ENABLE]
[DISPLAY]
[CLEAR]

Description:

The **mec** command is used to administer the operation of the **T-40** when confronted with a malicious peer.

A malicious peer is identified by attempting to connect to invalid TCP or UDP ports on the **T-40**. The action of connection attempts to invalid TCP ports has a separate setting for appropriate action (e.g. Firewall, ICMP, or TCP reset). The **mec** only uses such invalid attempts to *identify* the malicious peer. Once identified, the malicious peer is prevented from subsequently accessing valid TCP ports.

Attempts to a busy, but valid, TCP or UDP port does not count towards the malicious peer threshold.

When the **threshold** count of invalid attempts is reached, the IP address of the malicious peer is marked for discard in the cache. Packets received from any address on the malicious peer cache that are marked as such are discarded without further examination.

The **decay** seconds count will time out entries in the cache. If no traffic is received in the number of seconds specified, the entry is automatically removed.

The cache may be manually cleared. The cache is volatile and is reset empty on a reboot.

The operation of the malicious entity control may be disabled. Such configuration is non-volatile and will survive a reboot.

The **threshold** for determining that a peer is malicious may be set. Such configuration is non-volatile and will survive a reboot.

The **decay** specifies the number of seconds, It determines when an entry in a cache is removed is non-volatile and will survive a reboot.

The current configuration and contents of the malicious peer cache may be displayed with the **display** option.

An aggregate count of the packets discarded is available with the module level measurements. Individual, per address, access counts are displayed with the **display** option.

The default operation of the **mec** is that it is **disabled** to be consistent with prior releases. It must be enabled. The configuration is non-volatile and will survive a reboot. The threshold of invalid TCP and UDP ports is **ten**.

Options:

The **[threshold=<#>]** specifies the desired number of invalid port attempts that will trigger adding the malicious peer IP address to the cache.

The **[discard=<#>]** specifies the number of seconds an entry survives in the cache without further access.

The **[DISABLE]** specifies that the Malicious Peer control of the **T-40** is not to be utilized.

The **[ENABLE]** specifies that the Malicious Peer control of the **T-40** is to be utilized.

The **[CLEAR]** specifies that the cache is to be cleared. It does not affect the non-volatile data.

Examples:

mec display

mec threshold=16

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Copyright:

Name:

port – Configure Serial Ports.

Synopsis:

port < Port# > [type = < ORIG | RCV | X25 | SLM |
MMA | LAPB | DISCRETE | DEFAULT >]
[net=< LAN1 | LAN2 | ANY >]
[pdd = < Destination DNS Address >]
[dest = < IPv4 or IPv6 Address > | NONE]
[dport = < Destination TCP Port >]
[hport = < Hunt Group TCP Port Number >]
[prot = < Protocol >]
[dxe = < DCE | DCE >]
[clk = < NORM | RCVD >]
[phy = < RS232 | V35 | RS530 >]
[baud = < baud rate >]
[enc = < NRZ | NRZI >]
[pipeline = < #bytes | OFF >]
[ccar = < ON | OFF >]
[fill = < FLAG | MARK >]
[swcar = < ON | OFF >]
[ccts = < ON | OFF >]
[duplex=< FULL | HALF >]
[dbits = < 5 | 6 | 7 | 8 >]
[parity = < EVEN | ODD | NONE >]
[pap = < ON | OFF >]
[stop = < 1 | 1.5 | 2]
[attn = < 1BRK | 2BRK | NONE | Decimal Value >]
[flow = < XON | HW | NONE >]
[gbsync=< Generic BiSync Sync Char >]
[cug = [+ | -] < CUG Number >]
[crfix = < TRANS | NONULL >]
[crlf = < TRANS | NOLF >]

[PDDonCR = < ON | OFF >]
[rxidle=< OFF | < # Idle Minutes > >]
[txidle=< OFF | < # Idle Minutes > >]
[connbrk=< OFF | ON >]
[disceof=< ENABLE | DISABLE >]
[aaa=< RADIUS | NONE >]
[excl=< < MMA Exclusive Timer Ticks > | OFF >]
[idl=< OFF | ON >]
[api=< TELNET | RAW | SSH >]
[comment = ”user comment”]

[x25elm=< Companion Port # > | NONE]
[x25dxe=< DTE | DCE >]
[x25win=<LAPB Tx Window Size>]
[x25t1=< LAPB T1 Timer >]
[x25n2=< LAPB N2 Retry Counter >]
[x25t3=< #Seconds | DISABLE | DEFAULT >]
[x25dar=< ON | OFF >]
[x25pass=< OFF | DFLT | “Password String” >]
[x25xid=< XID Link ID >]

vc=<Range> [vcsvc=< PAD | PASS | RBP | MAC | ISO
SESS | AEP | AEPN | AEPX | AEMLT >]
[vcstate=< ENABLE | DISABLE >]
[vcckt=< SVC | PVC >]
[vctype=< ORIG | RCV >]
[vcwin=<VC Tx Window>]
[vcpkt=< 128 | 256 | 512 | 1024 >]
[vcdbit=< ON | OFF >]
[pvcreset=< ON | OFF >]
[pvcrstlnk=< OFF | ON | CONSTDCD | SWDCD >]
[vcpap=< LINKUP | ALWAYS >]
[svctclass=< NONE | Throughput Class >]
[svcfac= < AUTO | FORCED >]
[padecho=< ON | OFF >]

[paderase=< NONE | BS | <Hex Byte>]
[padidle=< #X.3 Ticks >]
[padbreak=< NONE | INTR |
RESET | BRKIND >]
[padparity=< TRANS | EVEN | ODD >]
[padcrlf=< NONE | RMT | VC | BOTH >]
[padfilter=< NONE | PRINTABLE >]
[padhdx=< OFF | ON >]
[padfwd=<NONE | CR | CRDROP | LTS
SEMI | EXCL | ALL | GRPx >]
[padcmap=< ON | OFF >]
[padapi=< RAW | TELNET >]
[PADCUG=[+|-]<CUG Number>]
[calling=< DEL | < DNIC+NTN > >]
[called=< DEL | < DNIC+NTN > >]
[ulen=< UData Length >]
[udata#=< HEX BYTE >]
[ext_calling=< DEL | < OSI NSAP > >]
[ext_called=< DEL | < OSI NSAP > >]
[hport=< VC Hunt Group TCP Port # >]
[padaaa=< RADIUS | NONE >]
[vccom="User Comment"]

Description:

The port command configures an individual port, or a portion of it for vertical protocols.

The **<Port#>** parameter is required and in the range of 1 through the number of physical ports on the T-40. Additionally, when a vertical protocol such as X.25 is used, the VCs to be configured are specified with a **vc=<Range>** argument immediately following the **<Port#>** and before the option list.

Options:

The **type=<>** option defines the operation and protocol suite of the port. A type of **ORIG** is a connection originator, a type of **RCV** is a connection listener, a type of

MMA defines a MultiMate asynchronous port, a type of **X25** defines an X.25 vertical protocol suite, a type of **LAPB** implements a vertical protocol suite with a single endpoint over LAPB, a type of **SLM** defines an SLM OS interface with a vertical protocol suite, a type of **DISCRETE** implements telemetry functions, and the type of **DEFAULT** sets the port to a commonly used configuration usable for asynchronous operation.

The **net=<#>** option specifies which network the port is to use. The T-40 is a dual LAN dual network interface. The default is for ports to use either LAN interchangeably. They may be restricted to using a specific LAN. A value of **LAN1** specifies the first network, a value of **LAN2** specifies the second network, and a value of **ANY** is the default and implies that both networks are used interchangeably.

The **pdd=<#>** option is used with connection originating ports to resolve the IP address using a DNS server. At least one DNS server must be defined. A value of **NONE** will clear the option.

The **dest=<#>** option is used with connection originating ports to specify the peer IP address. It is used for permanently configured connections such as modem replacement, or remote craft terminals.

The **dport=<#>** option is used in conjunction with the dest=<#> option and specifies the peer TCP port for the connection.

The **hport=<#>** option is used to specify a specific TCP port to be used for a port set to receive connections. If multiple ports use the same TCP port, then they round robin in a “hunt group” on that TCP port.

The **prot=<#>** option specifies the protocol set of a serial port when a vertical protocol suite is not used. Popular, and also uncommon, protocols are supported. These include Async, HDLC, SDLC, EBCDIC BiSync, ASCII BiSync, Uniscope, ALC, DDCMP, VIP, E2A, or DPS protocols. The default is the asynchronous protocol. The protocol option of RAW is equivalent to setting the protocol option to ASYNC and the API option to RAW. It is maintained for backward compatibility.

The **dxe=<#>** option specifies how the port behaves. A DCE synchronous port will provide a clock, and a DTE synchronous clock will accept a clock.

Asynchronous DTE ports use modem control signals, and DCE ones provide modem control signals.

The **clk=<#>** allows the use of a recovered clocks for isochronous interfaces. Under almost all circumstance, a normal clock is used.

The **phy=<#>** specifies the physical attributes of the interface. The three common ones are RS-232, V.35 (also known as V.11), and RS-530.

The **baud=<#>** specifies the baud rate for the serial port. The default rate is 9600 baud. Rates up to 115.2K baud are supported on serial ports.

The **enc=<#>** option allows specification of the line encoding for bits. Most serial interfaces use NRZ. Some use NRZI. Both are supported. The default is NRZ.

The **pipeline=<#>** allows the specification of a pipeline for frame based protocols where frames are not stored until complete before sending. The risk is an IP network transport delay that could cause an under-run on the frame. Normally, this option is disabled. It is typically used in modem replacement applications with low latency proprietary protocols.

The **ccar=<#>** allows the port to specify constant carrier. Normally, the DCD EIA signal follows the connection status to a peer. When CCAR=ON, the DCD EIA lead is always asserted regardless of connection status.

The **fill=<#>** is used with SDLC lines. Normal HDLC, and SDLC, lines fill empty periods between frames with flags. Links that use half duplex modems fill with MARK. Both are supported. The default is to fill with FLAG.

The **swcar=<#>** provides support for “switched carrier”. This is an option where the DCD EIA signal is switched consistent with two-wire modem operation. It is designed only for DCE operation. Devices designed to work with 202T modems will sometime require switched carrier for proper operation.

The **ccts=<#>** provides support for constant clear to send. This is an option where the CTS EIA lead is asserted regardless of the state of the RTS EIA lead. Normally, the CTS EIA lead will reflect the RTS EIA lead by the DCE.

The **duplex=<#>** provides for the T-40 enforcing one direction at a time data presentation. The default is full duplex, and the internal network connections are

full duplex. This is only the data presentation to the device. The default is full duplex operation.

The **dbits=<#>** specifies the number of data bits in a word. Values of five through eight are allowed. The default is eight. This value is combined with the parity selection and stop bit selection to form asynchronous words.

The **parity=<#>** specifies the parity for the asynchronous words. A value of EVEN, ODD, or NONE are allowed. The default is NONE.

The **stop=<#>** specifies the number of stop bits for the asynchronous words. The default is one stop bit.

The **pap=<#>** specifies whether the port is to be “permanently active” regardless of the state of the ingress EIA leads. The default is PAP to be enabled.

The **attn=<#>** allows originating ports to have an “attention session” with the T-40 without disconnecting with the peer. The default is NONE so that no attention session is allowed.

The **flow=<#>** specifies the flow control between the T-40 and the attached device for asynchronous protocols. The options are hardware flow control via the RTS and CTS leads, XON/XOFF flow control, or no flow control. The default is no flow control.

The **gbsync=<#>** specifies the BiSync synchronization character on a generic protocol version of BiSync. It is specific to that protocol suite.

The **cug = [+ | -] < CUG Number >** option allows the association of a closed user group with the serial port. There is a separate option for Virtual Circuits. See the AAA application note for more information on closed user groups.

The **crfix = < TRANS | NONULL >** option allows for correction to peer telnet clients that append a NULL character to each newline. Using this option will strip the NULL following the newline. The default is for transparent operation.

The **crlf = < TRANS | NOLF >]** option allows for connect to peer telnet devices that send both a CR and an LF for each newline. Some attached devices become confused. Using the option will strip the LF following the CR. The default is for transparent operation.

The **PDDonCR = < ON | OFF >]** is used in conjunction with the dest=<#> and dport=<#> options to define a permanent destination that is not automatically dialed. Typically used for on-site craft terminals. The T-40 displays a message to engage the CR to establish a connection. Please note that making a port permanently active with the PAP option will disable this function.

The **rxidle=< OFF | < # Idle Minutes > >** is used to establish an inactivity timer for the port in the ingress direction. That is, data being received from the serial port and sent to the peer. The value of OFF disables the timer. The default is OFF.

The **txidle=< OFF | < # Idle Minutes > >** is used to establish an inactivity timer for the port in the egress direction. That is, data being received from the peer and sent to the serial port. The value of OFF disables the timer. The default is OFF.

The **connbrk=< OFF | ON >** allows the configuration of the T-40 to send a BREAK indication automatically to the attached device at peer connection. It is normally used with specific telephony switch maintenance interfaces. The default is OFF so no break is sent.

The **disceof=< ENABLE | DISABLE >** allows the configuration of the T-40 to send an EOF indication automatically to the attached device at peer disconnect. It is normally used with specific telephony switch maintenance interfaces. The default is OFF so no EOF is sent.

The **idl=< OFF | ON >** allows the T-40 to enforce an intelligent inter-character delay for devices that cannot support the full line rate. It is intelligent in that it will not slow down any transport unless necessary and only to the extent necessary. The default is OFF.

The **aaa=< RADIUS | NONE >** allows the T-40 to enforce peer authentication with a RADIUS server. See the AAA application note for more details. RADIUS authentication is independent of closed user groups. The default is NONE.

The **excl=< < MMA Exclusive Timer Ticks > | OFF >** allows the selection of the exclusive operation of a tributary on a MultiMate asynchronous port. The exclusive timer prevents the tributaries from affecting each other. It can be disabled with **OFF**. The default is 180 ticks which is about 3 seconds.

The **api=< TELNET | RAW | SSH >** specifies the T-40 connection with the peer over TCP. The default is TELNET over TCP unless set otherwise. The TCP port number used for listening does not change with the API. It is important not to mix different API in the same hunt group.

The **comment = ”user comment”** allows for the user to denote something for the T-40 port. The port does not need to be out of service to add or change a comment.

The **x25elm=< <Companion Port #> | NONE >]** option is available only when the port is of type **x25**. It allows two ports to be defined as a mutually exclusive set of interfaces. The option defines the operation of the link itself. The PAD and VC options are individual per port. For a true mutually exclusive redundant operation, these need to be set in hunt groups.

The **x25dxe=<DTE | DCE>** option is available only when the port is of type **x25**. It allows changing the logical sex of the interface. Each X.25 interface needs a single DTE and a single DCE. Normally, the network side is the DCE. For some network elements, the converse is true. An example is the LTS, and a #5ESS IOP.

The **x25win=<LAPB Tx Window>** option is available only when the port is of type **x25**. It allows changing the number of frames sent without acknowledgement. The default number is seven per the specification. The **<LAPB Tx Window>** may have a value of one through seven inclusive.

The **x25t1=<T1 Timer Value>** option is available only when the port is of type **x25**. It allows changing the X.25 LAPB T1 protocol timer.

The **x25n2=<N2 Retry Counter>** option is available only when the port is of type **x25**. It allows changing the number of retries at the LAPB layer for protocol operations.

The **x25t3=< #Seconds | DISABLE | DEFAULT >** option is available only when the port is of type **x25**. It allows changing, or disabling, the X.25 T3 timer. This timer controls the frequency of the IDLE RRs sent to the peer when the link is idle.

The **x25dar=< ON | OFF >** option is available only when the port is of type **x25**. When enabled, the **BX.25** link layer will be immediately restarted should the peer disconnect. When disabled, the **B)X.25** link layer remains in disconnect mode pending further action from the peer. The option was added for TR-TSY-000385 AMATPS interfaces.

The **x25pass=< OFF | DFLT | “Password String” >** option is available only when the port is of type **x25**. This option allows the setting of a **BX.25** I-Frame Password for the

link. When set to **OFF**, the link does not issue nor does it expect an I-Frame Password. When the **DFLT** option is set, the TR-TSY-000385 AMATPS passwords are installed. Otherwise, a custom password may always be configured as a double quoted string. Specifics of this interface may be found in **BX.25** Issue 3.

The **x25xid=< XID Link ID >** option is available only when the port is of type **x25**. This option allows the setting of the XID link ID to be used when BX.25 I-Frame Passwords are exchanged. If the **x25pass** option is enabled and the **x25xid** has not been set, the default link id is 4. Specifics of this interface may be found in **BX.25** Issue 3.

The **vc=<Virtual Circuit Number>** is a modifier on the port number when the port is of type **x25**. It is required for configuration options that relate to an individual virtual circuit.

The **vcsvc=< PAD | PASS | RBP | MAC| ISO | SESS >** option determines the type of service for a virtual circuit. The VC must have been specified on the command line. When set to the value of **PAD**, the virtual circuit is terminated in an X.3 PAD. When a value of **PASS** is selected, an X.25 pass-through service is selected. The latter is used for VC aggregation. When a value of **MAC** is selected, a special interface for the MacStar operation system is used. When a value of **RBP** is selected, the *Record Boundary Preservation* protocol is selected. The **ISO** value selects ISO X.25 used with FTAM implementations. The **SESS** value selects the (B)X.25 session layer interface. The **AEP**, **AEPN**, **AEPX,** and **AEMLT** values are used for interworking with existing Applied Innovation equipment.

The **vcckt=< SVC | PVC >** option determines the operation of a virtual ciruit. When the **PVC** option is selected, connections will not generate call setup or call clear X.25 packets. However, the **T-4180** will still respond to call setup and call clear packets generated by the attached device. When the **SVC** option is selected, a TCP connection to the virtual circuit will generate a call setup X.25 packet transaction. A disconnect will generate a call clear transaction. If the X.25 device clears the call, the TCP connection will also be dropped.

The **vctype=< ORIG | RCV >** option determines if a VC originates or receives an IP connection. The default is to receive an IP connection and establish an SVC. Only a VC with **vcckt=SVC** may be configured as originate. If the SVC is **vctype=ORIG**, the SVC mapping table is used to establish the IP connection upon receipt of a (B)X.25 call request packet.

The **vcwin=<VC Tx Window Size>** specifies the packet layer window size to be used for transmission purposes on the affected VCs. The valid values are one through seven inclusive. The VC must have been previously specified on the command line.

The **vcpkt=< 128 | 256 | 512 | 1024 >** specifies the packet size boundary upon which a packet is generated when the selected forwarding condition is not met. Any such packet will have the “More” bit set to indicate the transaction is not complete.

The **vcdbit=< ON | OFF >** specifies the option for the Delivery Confirmation (“D”) bit operation of the virtual circuit. When set to ON, the packets generated will have the “D” bit encoded per the BX.25 specification. When set to OFF, the “D” bit will not be encoded. The default is the “D” bit not encoded.

The **pvcreset=<ON | OFF >** option specifies the operation of a PVC when a connection is made. When set to **ON**, the PVC is issued a RESET upon a user connection. When set to **OFF**, the PVC continues with it’s previous state. Some legacy devices cannot tolerate a PVC RESET and this option allows interoperability. The default is to have RESET enabled (ON).

The **pvcrstlnk=< OFF | CONSTDCD | SWDCD >** option specifies the operation of the link supporting the PVC when a connection is made. When set to any value other than **OFF**, the entire link is issued a RESTART upon a connection to the PVC. The PVC itself may also get a RESET depending on the setting of the **pvcreset** option. When set to **OFF**, the link behaves per the relevant (either **X.25** or **BX.25**) specification and no RESTART is issued at user connect. The **pvcrstlnk=SWDCD** option also switches the DCD lead as the BX.25 link layer is controlled. This yields a more effective simulation of a dynamic modem connection as is required by some legacy devices. Some switches (i.e. #5ESS) cannot have the DCD cycled as it will cause the link to not restart. The **pvcrstlnk=CONSTDCD** should be used in that situation as it will maintain the assertion of the DCD lead. The **pvcrstlnk** option is provided strictly for interoperability with select legacy devices. As a general rule, the **pvcrstlnk** feature should remain in the **OFF** condition unless specifically desired. The default is the **OFF** condition.

The **[vcpap=< LINKUP | ALWAYS >]** option operates on a VC in a similar manner to the Permanently Active (**PAP**) attribute of a serial port. Under normal circumstances, any TCP connection made to a VC’s TCP listen port is dropped immediately if the associated link is not active. This remains the default condition. The value of **LINKUP** to the **vcpap** option is this default condition. By setting the **vcpap=ALWAYS** option, the TCP is allowed to connect to the VC regardless of link state. Some operation systems prefer such operation. When configured as such, the verify for the VC will show “w/PAP” on the connection line. In the default condition, a TCP disconnect is noted on the snooper output for the virtual circuit if enabled.

The **svctclass=< NONE | Throughput >** option specifies a throughput class declared on X.25 call connect, and call accept packets. The throughput class is the same in both

transmit and receive directions. As a general rule, it should always be set to **NONE** such that no limiting throughput class is established. All specification allowable values for throughput class are supported. These range from 75bps to 48000bps inclusive. The option is provided for interface to devices that require a throughput class to be explicitly negotiated.

The **svcfac=< AUTO | FORCED >** option specifies the population of the facilities options in an SVC call setup packet. Normally, the facilities are only populated when a service class is defined, or if extended RFC1006 address is utilized. The default is **AUTO** that utilizes this operation. The **FORCED** option emits the facilities on every SVC call setup regardless of other configuration.

The **padecho=< ON | OFF >** refers to reference #2 in the X.3 parameter list. When set to **OFF**, the PAD will not echo characters back to the IP endpoint. When set to the value of **ON**, all characters are to be echoed back to the IP source.

The **paderase=< NONE | BS | <HEX BYTE> >** option specifies reference #16 in the X.3 parameter list. It is used with manual telnet connections to an X.25 VC. It sets the buffer editing “erase” character. When the special “erase” character is received by the X25PAD for a specific virtual circuit, the previous character in the packet accumulation buffer is deleted. If the **padecho** option was also enabled, a “Backspace Blank Backspace” sequence is emitted to the user. When the **paderase** option is set to NONE, the PAD will not have a special “erase” character. When the value is BS, it is set to the ASCII backspace character 0x08. Otherwise, any character may be entered as a hexadecimal byte in 0xXX notation. This option is only valid on X.25 virtual circuits configured with the PAD interface.

The **padfwd=<NONE | CR | CRDROP | SEMI | LTS | EXCL | GRPx | ALL >** option specifies reference #3 of the X.3 parameter list. This is the forwarding condition (outside the PAD timer) which will forward data towards the X.25 virtual circuit. A value of **NONE** indicates that there are no character forwarding conditions. A value of **CR** indicates that a carriage return will forward any accumulated data (including the carriage return). A value of **CRDROP** indicates that a carriage return will forward any accumulated data (but not including the carriage return). A value of **SEMI** indicates that a semicolon will forward any accumulated data including the semicolon. A value of **LTS** indicates that a lesser than symbol (‘<’) will forward any accumulated data including the symbol itself. A value of **EXCL** indicates that an exclamation mark will forward any accumulated data including the exclamation mark. A value of **ALL** indicates that all data is to be forwarded immediately. The **ALL** option has the effect of generating single user character X.25 packets on this virtual circuit. The **GRPx** values specify selected groups of forwarding characters. **GRP1** forwards on ESC, BEL, ENQ, and NAK. **GRP2** forwards on DEL,

CAN, DC2. **GRP3** forwards on ETX, EOT. **GRP4** forwards on HT, LF, VT, and FF. **Multiple forwarding conditions are allowed simultaneously**. Setting **padfwd** to a value aggregates with the previous value of **padfwd**. The **padfwd=none** is required to clear the forwarding conditions.

The **padidle=<#X.3 ticks>** parameter refers to reference #4 of the X.3 parameter list. This is the time forwarding condition. When it expires, it will forward any data collected to the X.25 circuit. The timer is reset to the specified timer value whenever a forwarding condition is reached. The value is based on ticks of 1/20th of a second each per the X.3 specification.

The **padbreak=< NONE | INTR | RESET | BRKIND >** parameter refers to reference #7 of the X.3 parameter list. This is the action to be taken when a break indication (a standard Telnet encapsulated value) is received from the remote IP endpoint. A value of **NONE** will ignore the break, and it is deleted from the data stream. The value of INTR will generate an X.25 interrupt packet. The value of **RESET** will generate an X.25 virtual circuit . The value of **BRKIND** will generate an X.29 “indication of break” message on the X.25 virtual circuit.

The **padparity=< TRANS | EVEN | ODD >** parameter is not present in the X.3 parameter list. It allows special parity treatment for interface to network elements that require parity. The default value is transparent operation. The value of **TRANS** sets the operation to be transparent. When the parity treatment is transparent, the data is not modified in either direction. The value of **EVEN** sets the operation to be even parity towards the (B)X.25 device, and stripped parity towards the TELNET. The value of **ODD** sets the operation to be odd parity towards the (B)X.25 device, and stripped parity towards the TELNET.

The **padcrlf=<NONE | RMT | VC | BOTH>** parameter refers to reference #13 of the X.3 parameter list. This is the action to be taken when a CR is received in the data stream from the remote IP endpoint. A value of **NONE** indicates that there is to be no LF (line feed) insertion. A value of **RMT** will insert an LF following a CR whenever it is sent towards the remote IP endpoint. A value of **VC** will insert an LF following a CR whenever it is sent towards the X.25 virtual circuit. A value of **BOTH** will insert an LF following a CR in either direction.

The **padfilter=<NONE | PRINTABLE >** parameter enables a data filter. The default is **NONE** and implies transparent operation. When set to **PRINTABLE**, only characters that are printable, CR, and LF are allowed towards the VC. All data received from the VC remains transparent with either option.

The **padhdx=< DISABLE | ENABLE >** parameter allows control over telnet options when the Telnet API is used with the PAD. The normal operation is **DISABLE**. When enabled, the peer telnet client is forced into HDX mode. Some operations systems require those options to work properly. The value of **OFF** is an alternate for **DISABLE**. The value of **ON** is an alternate for **ENABLE**.

The **padcmap=< ON | OFF >** option provides the automatic case mapping from lower case to upper case. When the option is set to **ON**, all lower case characters are automatically converted to upper case. When **OFF**, no transformations are performed.

The **padapi=< TELNET | RAW >** option provides a means of selecting the PAD virtual circuit to use **raw** protocol. The **raw** protocol is essentially asynchronous, but without the benefit of Telnet RFC encapsulation. It is used for applications that do not implement the Telnet RFC. The default for this option is to use the Telnet encapsulation.

The **padcug=[+|-]<CUG Number>** parameter allows the virtual circuit connection to be protected by closed user group membership. The closed user group feature is significant only for PAD service. The closed user group address entries are defined with the **cug** command. Any or all closed user group entries may be assigned with a virtual circuit.

The **calling=<DNIC+NTN>** parameter is used to specify the “calling address” on an SVC call setup packet. Most devices do not require a calling address. This option allows the specification for a device which does require same. The fixed value of **DELETE** will remove any configured address.

The **called=<DNIC+NTN>** parameter is used to specify the “called address” on an SVC call setup packet. Most devices do not require a called address. This option allows the specification for a device that does require same. The fixed value of **DELETE** will remove any configured address.

The **ext_calling=<OSI NSAP>** parameter is used to specify the “extension calling address” on the SVC call setup packet of an OSI X.25 connection. The option may be deleted with the value ‘delete’. This parameter is only required with the OSI X.25 interface. The fixed value of **DELETE** will remove any configured address.

The **ext_called=<OSI NSAP>** parameter is used to specify the “extension called address” on the SVC call setup packet of an OSI X.25 connection. The option may be deleted with the value ‘delete’. This parameter is only required wit the OSI X.25 interface. The fixed value of **DELETE** will remove any configured address.

The **ulen=< UDATA Length >** parameter specifies the length of the user data field to be used in an SVC call setup packet. The default is one byte of value 0xC1.

The **udata#=< Hex Byte >** parameter allows modification of the user data field to be used in an SVC call setup packet. The **#** may be a number in the range of one through sixteen. The **< Hex Byte >** is of the form 0xXX.

The **vccom="User Comment"** parameter allows the specification of a comment line for the one or more VCs. The comment may be up to 32 characters in length, and may contain spaces and some special characters. It may not contain an embedded double quote. Comments are allowed in upper and lower case and may be changed with the port in service. Once entered, the comments are displayed on the port verify.

The **padaaa=< RADIUS | NONE >** allows the PAD VC to be authorized by the RADIUS server in the same manner as serial ports. See the AAA application note for more details. The default is NONE.

Examples:

This command configures an asynchronous receive port at 9600 baud. It uses the most common options.

```
port 1 type=default
```

This command configures the port to be an X.25 DCE with a logical DXE of DCE. All the VCs are configures as PAD with default options.

```
port 1 type=x25
```

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rad – Configure RADIUS servers.

Synopsis:

rad < PRI | SEC > [ipaddr=< RADIUS Server IP Address >]
[port=< RADIUS Server UDP Port >]
[key=<"Double Quoted String" | NONE >]
[ENABLE]
[DISABLE]

Description:

At least one RADIUS server must be defined and enabled for authentication to proceed.

Options:

Configure the secret key to match the server being used. The default UDP port is 1812 per RFC 2865. It may be changed to any value. Some RADIUS servers use UDP 1645.

Examples:

rad pri ipaddr=192.168.0.205 port=1812 key="Music Box Dancer" enable

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reboot – Restart Device

Synopsis:

reboot [newip=<New IPv4 Address>]
[newmask=<New IPv4 Network Mask>]
[newgate=<New IPv4 Gateway Address>]

Description:

This command resets the unit, which allows configured physical attributes to take effect.

The command is only visible if the user is logged in. The command has optional arguments to allow the remote alteration of the network configuration. If any network configuration change is required, the user is prompted for the password as a verification check before the reboot is actually executed. After the reboot, the console interface returns to the logged-out mode.

A **reboot** command with LAN re-configuration will be applied to the same LAN on which the reboot command was entered. A **reboot** command entered on the serial console affect LAN1.

The **reboot** command will always prompt for confirmation. In releases prior to 6.x, the password is required. In current release, only a ‘c’ontinue is needed. The change was needed to avoid having to remove the TACACS+ servers from service on the device for remote IP configuration changes where the user is defined on TACACS+ and not locally on the device.

Examples:

```
reboot
reboot newip=192.168.0.200
reboot newip=135.86.0.100 newmask=255.255.252.0 newgate=135.86.0.1
```

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rm – Take an object out of service.

Synopsis:

rm [mod]
[LAN1 | LAN 2]
[PORT <#>]
[CONSOLE < Console ID >]
[LOGGER < Logger ID>]

Description:

The remove command is used to take an object out of service. Normally, this is done to change the configuration or when it is not required for service.

.

Options:

The **[mod]** indicates the module is to be taken out of service. This should only be attempted from the serial console.

The **[LAN1 | LAN2]** indicates the respective LAN PHY is to be taken out of service. This is typically necessary for configuration changes.

The **[PORT <#>]** indicates the respective serial port is to be taken out of service.

The **[CONSOLE <Console ID>]** indicates the network console to be taken out of service. The serial console cannot be removed from service.

The **[LOGGER=< Logger ID >]** indicates the TL1 Logger to be taken out of service.

Examples:

rm p 1
rm console 3
rm lan1

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rs – Place an object in service.

Synopsis:

rs [mod]
[LAN1 | LAN 2]
[PORT <#>]
[CONSOLE < Console ID >]
[LOGGER < Logger ID>]

Description:

The restore command is used to place an out of service object into service.

.

Options:

The **[mod]** indicates the module is to be placed into service. Please note that it is almost never necessary to take the module out of service.

The **[LAN1 | LAN2]** indicates the respective LAN PHY is to be placed into service.

The **[PORT <#>]** indicates the respective serial port is to be placed into service.

The **[CONSOLE <Console ID>]** indicates the network console to be placed into service.

The **[LOGGER=< Logger ID >]** indicates the TL1 Logger to be placed into service.

Examples:

rs p 1
rs console 3
rs lan1

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SVC – Configure SVC X.121 Address Mapping

Synopsis:

svc <Tag> [port=< DELETE | < Serial Port# of SVC> >]
[calling=< < DELETE | < NPN+DNIC > >]
[called=< < DELETE | < NPN+DNIC > >]
[ipaddr=< IPv4 or IPv6 Address >]
[network=< LAN1 | LAN2 | ANY >]
[dport=< Destination TCP Port >]
[DELETE]

Description:

A VC may be configured as an originating SVC. That is, an SVC that expects a call request from the (B)X.25 interface towards the IP network.

The (B)X.25 call request packet may contain a called address but the address is not required.

Further, the (B)X.25 call request packet may contain the calling address but this address too is not required.

These (B)X.25 addresses are of the form NPN+DNIC and are not usable within an IP infrastructure. The **T-40** uses a prioritized mapping table to deal with all the contingencies associated with this type of interface.

The mapping table uses an entry per association, and always searches the mapping table in incrementing tag order. That is, the first tag (#1) will always be

searched before the 2nd, and so on. NULL (deleted) entries between valid mapping entries are allowed.

The mapping table allows wildcard matches on the (B)X.25 calling and called addresses as well as the port number.

The mapping table also allows exact matches. For example, it is possible to associate a different IP network destination based on the (B)X.25 calling address even if the (B)X.25 called address is the same.

Matching an SVC call request with no (B)X.25 address specified is done with a wildcard on both (B)X.25 calling and (B)X.25 called address in the mapping table.

Since the mapping table is always searched predictably, a hierarchy of mapping results can be easily created.

Options:

The **<Tag>** indicates the entry in the mapping table to be modified or deleted. The first entry value is 1, and increments up to the number of entries in the table.

The **[port=< DELETE | < Serial Port# of SVC> >]** indicates the serial port on which the SVC is to arrive. Existing entries may be removed with a DELETE operation.

The **[calling=< < DELETE | < NPN+DNIC > >]** indicates the (B)X.25 NPN+DNIC calling address as expected on the SVC call request packet. Existing entries may be changed into a wildcard by a DELETE operation.

The **[called=< < DELETE | < NPN+DNIC > >]** indicates the (B)X.25 NPN+DNIC called address as expected on the SVC call request packet. Existing entries may be changed into a wildcard by a DELETE operation.

The **[ipaddr=< IPv4 or IPv6 Address >]** indicates the IP address to which the (B)X.25 address match is to be associated. An IP address is always required for a match.

The **[network=< LAN1 | LAN2 | ANY >]** indicates the network to use for the IP connection establishment. The value of ANY will use either network on alternate attempts.

The **[dport=< Destination TCP Port >]** indicates the TCP port at the IP destination endpoint to use in the connection request. It is always required, and may not be zero.

The **[DELETE]** option will delete the entire mapping entry. The space may be left empty and will be skipped for any address match attempts.

Examples:

svc 1 calling=7177841114 called=7177841001 ipaddr=152.215.72.40 dport=30603
svc 16 ipaddr=192.168.0.205 dport=30001

In this example, a mapping table is configured for all ports. That is, the port number in the table entry is a wildcard.

The first tag is an exact match on a particular calling and called X.121 address. It could have been either or neither.

The last tag is the default route if no matches are found in the table. All fields are left as wild cards.

Notice that there are blank spaces in the table. The table is always searched hierarchically and empty locations ignored.

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T-40 MIB – SNMP information base for the T-40 series devices.

Description:

The T-40 MIB is a diverse grouping of information that is available via SNMP get operations. The T-40 supports the standard MIB-II which is generic. This MIB presents vendor specific information. Examples are presented in this man page using the standard Linux utility “snmpget”.

The first two objects of this MIB were implemented in prior feature releases, and the balance in R6.4 feature release. If a MIB object is not implemented, the SNMP client on the T-40 will return an indication.

Private MIB Definition:

```
T40-MIB { iso org(3) dod(6) internet(1) private(4) enterprises(1) 3791 }

DEFINITIONS ::= BEGIN

IMPORTS
      enterprises
            FROM RFC1155-SMI

      OBJECT-TYPE
            FROM RFC-1212

      DisplayString
            FROM RFC1213;

telecomp    OBJECT IDENTIFIER ::= { enterprises 3791 }

products    OBJECT IDENTIFIER ::= { telecomp 1 }

t40series   OBJECT IDENTIFIER ::= { products 1 }

NumPhyPort  OBJECT-TYPE
            SYNTAX INTEGER
            ACCESS read-only
            STATUS mandatory
            DESCRIPTION
                "The number of physical ports present on this T-40 series
implementation."
            ::= { t40series 1 }

PhyPortStat OBJECT-TYPE
            SYNTAX DisplayString (SIZE (0..40))
            ACCESS read-only
            STATUS mandatory
            DESCRIPTION
                 "A string of characters, one per port, indicating
physical port status."
            ::= { t40series 2 }

BkupStatus  OBJECT-TYPE
            SYNTAX DisplayString (SIZE (0..32))
            ACCESS read-only
            STATUS mandatory
            DESCRIPTION
                 "A text string indication that the DB was changed since
the last backup."
```

```
            ::= { t40series 3 }

DeviceID    OBJECT-TYPE
            SYNTAX DisplayString (SIZE (0..16))
            ACCESS read-only
            STATUS mandatory
            DESCRIPTION
                 "A text string containing the Device ID."
            ::= { t40series 4 }

OwnerID     OBJECT-TYPE
            SYNTAX DisplayString (SIZE (0..16))
            ACCESS read-only
            STATUS mandatory
            DESCRIPTION
                 "A text string containing the Registration."
            ::= { t40series 5 }

ReleaseID   OBJECT-TYPE
            SYNTAX DisplayString (SIZE (0..50))
            ACCESS read-only
            STATUS mandatory
            DESCRIPTION
                 "A text string that contains the Software Info."
            ::= { t40series 6 }

NumSyncPort OBJECT-TYPE
            SYNTAX INTEGER
            ACCESS read-only
            STATUS mandatory
            DESCRIPTION
                "The number of ports that may be simultaneously active
with a synchronous protocol."
            ::= { t40series 7 }

NumDiscPort OBJECT-TYPE
            SYNTAX INTEGER
            ACCESS read-only
            STATUS mandatory
            DESCRIPTION
                "The number of ports that may be simultaneously discrete
for scan and control points."
            ::= { t40series 8 }
```

```
ScanPtStat  OBJECT-TYPE
            SYNTAX DisplayString (SIZE (0..80))
            ACCESS read-only
            STATUS mandatory
            DESCRIPTION
                 "A string of characters, two per port, indicating Scan
Point status."
            ::= { t40series 9 }

            END
```

Standard MIB Variables:

RO = Read-Only Variable
R/W = Read/Write Variable
SIV = Storage is Volatile

MIB Variable Number	Name	MIB	Console Equivalent	Access	Notes
1.3.6.1.2.1.1.1.0	SysDescr	MIB-II	Banner Message	RO	
1.3.6.1.2.1.1.2.0	SysObjectID	MIB-II	None	RO	
1.3.6.1.2.1.1.3.0	SysUpTime	MIB-II	None	RO	
1.3.6.1.2.1.1.4.0	SysContact	MIB-II	None	R/W	SIV
1.3.6.1.2.1.1.5.0	SysName	MIB-II	None	R/W	SIV
1.3.6.1.2.1.1.6.0	SysLocation	MIB-II	None	R/W	SIV
1.3.6.1.2.1.1.7.0	SysServices	MIB-II	None	RO	
1.3.6.1.2.1.4.1.0	IpForwarding	MIB-II	None	RO	
1.3.6.1.2.1.4.2.0	IpDefaultTTL	MIB-II	None	RO	
1.3.6.1.2.1.4.3.0	IpInReceives	MIB-II	Number of Ethernet Pkts Rcvd	RO	
1.3.6.1.2.1.4.4.0	IpInHdrErrors	MIB-II	Nbr of Packets w/Header Errs	RO	
1.3.6.1.2.1.4.5.0	IpInAddrErrors	MIB-II	Nbr Rx Packets w/Wrong Addr	RO	
1.3.6.1.2.1.4.6.0	IpForwDatagrams	MIB-II	None	RO	
1.3.6.1.2.1.4.7.0	IpInUnknownProtos	MIB-II	Nbr of Packets w/Unk Protocol	RO	
1.3.6.1.2.1.4.8.0	IpInDiscards	MIB-II	Nbr of Packets Disc due to Resource	RO	
1.3.6.1.2.1.4.9.0	IpInDelivers	MIB-II	Inferred from DMEAS counters	RO	
1.3.6.1.2.1.4.10.0	IpOutRequests	MIB-II	Number of Device Frames Transmitted	RO	
1.3.6.1.2.1.4.11.0	IpOutDiscards	MIB-II	Nbr of Port frames Disc due to Resource	RO	
1.3.6.1.2.1.4.12.0	IpOutNoRoutes	MIB-II	None	RO	
1.3.6.1.2.1.4.13.0	IpReasmTimeout	MIB-II	None	RO	
1.3.6.1.2.1.4.14.0	IpReasmReqds	MIB-II	None	RO	
1.3.6.1.2.1.4.15.0	IpReasmOKs	MIB-II	None	RO	
1.3.6.1.2.1.4.16.0	IpReasmFails	MIB-II	None	RO	
1.3.6.1.2.1.4.17.0	IpFragOKs	MIB-II	None	RO	
1.3.6.1.2.1.4.18.0	IpFragFails	MIB-II	None	RO	
1.3.6.1.2.1.4.19.0	IpFragCreates	MIB-II	None	RO	
1.3.6.1.2.1.4.21.0	IpRoutingDiscards	MIB-II	None	RO	
1.3.6.1.2.1.5.1.0	IcmpInMsgs	MIB-II	None	RO	
1.3.6.1.2.1.5.2.0	IcmpInErrors	MIB-II	ICMP Errors	RO	

1.3.6.1.2.1.5.3.0	IcmpInDestUnreach	MIB-II	None	RO	
1.3.6.1.2.1.5.8.0	IcmpInEchos	MIB-II	Nbr of Pings	RO	
1.3.6.1.2.1.5.9.0	IcmpInEchoReps	MIB-II	None	RO	
1.3.6.1.2.1.6.1.0	TcpRtoAlgorithm	MIB-II	None	RO	
1.3.6.1.2.1.6.2.0	TcpRtoMin	MIB-II	None	RO	
1.3.6.1.2.1.6.3.0	TcpRtoMax	MIB-II	None	RO	
1.3.6.1.2.1.6.4.0	TcpMaxConn	MIB-II	None	RO	
1.3.6.1.2.1.6.5.0	TcpActiveOpens	MIB-II	None	RO	
1.3.6.1.2.1.6.6.0	TcpPassiveOpens	MIB-II	None	RO	
1.3.6.1.2.1.6.7.0	TcpAttemptFails	MIB-II	None	RO	
1.3.6.1.2.1.6.8.0	TcpEstabResets	MIB-II	None	RO	
1.3.6.1.2.1.6.9.0	TcpCurrEstab	MIB-II	None	RO	
1.3.6.1.2.1.6.10.0	TcpInSegs	MIB-II	None	RO	
1.3.6.1.2.1.6.11.0	TcpOutSegs	MIB-II	None	RO	
1.3.6.1.2.1.6.12.0	TcpRetransSegs	MIB-II	None	RO	
1.3.6.1.2.1.6.13.X	TcpConnTable Entries	MIB-II	None	RO	
1.3.6.1.2.1.6.14.0	TcpInErrs	MIB-II	None	RO	
1.3.6.1.2.1.6.15.0	TcpOutRsts	MIB-II	None	RO	
1.3.6.1.2.1.7.1.0	UdpInDatagrams	MIB-II	Derived from other Counts.	RO	
1.3.6.1.2.1.7.2.0	UdpNoPorts	MIB-II	Non-Peer and Spurious UDP errors	RO	
1.3.6.1.2.1.7.3.0	UdpInErrors	MIB-II	Frame Errors	RO	
1.3.6.1.2.1.7.4.0	UdpOutDatagrams	MIB-II	Frames Sent, Keep Alive Messages sent, etc.	RO	
1.3.6.1.2.1.7.5.X	udpEntry Table	MIB-II	None	RO	
1.3.6.1.2.1.11.1.0	SnmpInPkts	MIB-II	None	RO	
1.3.6.1.2.1.11.3.0	SnmpInBadVersions	MIB-II	None	RO	
1.3.6.1.2.1.11.4.0	SnmpInBadCommunityNames	MIB-II	None	RO	
1.3.6.1.2.1.11.5.0	SnmpInBadCommunityUses	MIB-II	None	RO	
1.3.6.1.2.1.11.6.0	SnmpInASNParseErrs	MIB-II	None	RO	
1.3.6.1.2.1.11.30.0	SnmpEnableAuthenTraps	MIB-II	None	R/W	SIV
1.3.6.1.2.1.11.31.0	SnmpSilentDrops	MIB-II	None	RO	
1.3.6.1.2.1.11.32.0	SnmpProxyDrops	MIB-II	None	RO	

Examples:

NumPhyPort

The NumPhyPort is the number of physical ports on the **T-40** series device. It will be 1 for a **T-40S**, 4 for a **T-40L**, and 40 for a **T-40**.

The NumPhyPort may be retrieved by the following standard UNIX command if an SNMP manager is not to be used.

snmpget -v1 -c ${COMM} -Ov ${IPADDR} 1.3.6.1.4.1.3791.1.1.1.0

Where ${COMM} is the SNMP community to be used for the exchange and is usually **public**. It may be configured on the **T-40** to a unique value if desired. The ${IPADDR} is the IP address of the **T-40**.

PhyPortStat

Each character in the PhyPortStat is ASCII encoded hexadecimal with the four bits represented by the character in the form:

< Link Status Valid > < Link Status > < Ingress EIA > < Service State >

The < Service State > bit will be zero if the port is 'Out of Service', and one if the port is 'In Service'. The other bits are only valid if the port is 'In service'.

The <Ingress EIA> is the DTR or DCD lead input to the T-40. This will be dependent on the configuration of the port cabling. A value of zero implies that the ingress EIA lead is de-asserted. A value of one implies that the ingress EIA lead is asserted.

The <Link Status> bit is only relevant for ports that are configured for a protocol that has a link layer. An example is X.25. The <Link Status> bit will be zero if the link is not active, and one if the link is active.

The <Link Status Valid > bit indicates whether the <Link Status> bit is relevant. It will be zero if the port is configured where there is no link status; and one if the port is configured where there is a link status.

The theoretical valid values of PhyPortStat are ASCII 0 – 9, and A – F. However, there will be some impossible combinations so not all values will be emitted.

The PhyPortStat may be retrieved by the following standard UNIX command if an SNMP manager is not to be used.

snmpget -v1 -c ${COMM} -Ov ${IPADDR} 1.3.6.1.4.1.3791.1.1.2.0

Where ${COMM} is the SNMP community to be used for the exchange and is usually **public**. It may be configured on the **T-40** to a unique value if desired. The ${IPADDR} is the IP address of the **T-40**.

BkupStatus

The BkupStatus is an indication that the T-40 DB has been changed since the last DB backup. It returns a string of “T-40 DB Backup NOT Required.” if there has been no change to the database and “T-40 DB Backup IS Required.” if there has been a change.

The BkupStatus may be retrieved by the following standard UNIX command if an SNMP manager is not to be used.

snmpget -v1 -c ${COMM} -Ov ${IPADDR} 1.3.6.1.4.1.3791.1.1.3.0

Where ${COMM} is the SNMP community to be used for the exchange and is usually public. It may be configured on the **T-40** to a unique value if desired. The ${IPADDR} is the IP address of the **T-40**.

DeviceID

The DeviceID is the **T-40** identification as depicted on the VFY MOD or the product label.

The DeviceID may be retrieved by the following standard UNIX command if an SNMP manager is not to be used.

snmpget -v1 -c ${COMM} -Ov ${IPADDR} 1.3.6.1.4.1.3791.1.1.4.0

Where ${COMM} is the SNMP community to be used for the exchange and is usually public. It may be configured on the **T-40** to a unique value if desired. The ${IPADDR} is the IP address of the **T-40**.

OwnerID

The OwnerID is the registered end user of the **T-40**. If the device is not registered, then the value of “Not Registered” is emitted. All T-40 series devices are registered at time of manufacture so the condition should never occur.

The OwnerID may be retrieved by the following standard UNIX command if an SNMP manager is not to be used.

snmpget -v1 -c ${COMM} -Ov ${IPADDR} 1.3.6.1.4.1.3791.1.1.5.0

Where ${COMM} is the SNMP community to be used for the exchange and is usually public. It may be configured on the T-40 to a unique value if desired. The ${IPADDR} is the IP address of the T-40.

ReleaseID

The ReleaseID is a string containing the software release and build date.

The ReleaseID may be retrieved by the following standard UNIX command if an SNMP manager is not to be used.

snmpget -v1 -c ${COMM} -Ov ${IPADDR} 1.3.6.1.4.1.3791.1.1.6.0

Where ${COMM} is the SNMP community to be used for the exchange and is usually public. It may be configured on the **T-40** to a unique value if desired. The ${IPADDR} is the IP address of the **T-40**.

NumSyncPort

The NumSyncPort is the number of physical ports on the **T-40** series device that can operate with a synchronous protocol simultaneously. It will be one for a **T-40S**, four for a **T-40L**, and zero through forty for a **T-40** depending on the exact model ordered.

The NumSyncPort may be retrieved by the following standard UNIX command if an SNMP manager is not to be used.

snmpget -v1 -c ${COMM} -Ov ${IPADDR} 1.3.6.1.4.1.3791.1.1.7.0

Where ${COMM} is the SNMP community to be used for the exchange and is usually public. It may be configured on the T-40 to a unique value if desired. The ${IPADDR} is the IP address of the **T-40**.

NumDiscPort

The NumDiscPort is the number of physical ports on the **T-40** series device that can operate as discrete. These are used for scan points, and control points. It is dependent on the exact model **T-40** series device ordered.

The NumDiscPort may be retrieved by the following standard UNIX command if an SNMP manager is not to be used.

snmpget -v1 -c ${COMM} -Ov ${IPADDR} 1.3.6.1.4.1.3791.1.1.8.0

Where ${COMM} is the SNMP community to be used for the exchange and is usually public. It may be configured on the **T-40** to a unique value if desired. The ${IPADDR} is the IP address of the **T-40**.

ScanPtStat

The ScanPtStat is a hexadecimal encoding of the scan points on a discrete port. Each physical port uses two hexadecimal digits (“0” – “9” and “A” –“F”) encoded as follows:

First Hex Digit → < Discrete Port > < Service State > < 0 > < Scan Pt. E>
Second Hex Digit → < Scan Pt. D > < Scan Pt. C > < Scan Pt. B > < Scan Pt. A >

Please note that the **T-40S** and **T-40L** support five scan points per port (i.e. A – E). The **T-40** has RJ45 based serial ports and therefore support three scan points per port (i.e. A – C).

The ScanPtStat may be retrieved by the following standard UNIX command if an SNMP manager is not to be used.

snmpget -v1 -c ${COMM} -Ov ${IPADDR} 1.3.6.1.4.1.3791.1.1.9.0

Where ${COMM} is the SNMP community to be used for the exchange and is usually **public**. It may be configured on the **T-40** to a unique value if desired. The ${IPADDR} is the IP address of the **T-40**.

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tac – Configure TACACS+ servers.

Synopsis:

tac < PRI | SEC > [ipaddr=< TACACS+ Server IP Addr>]
[port=< TACACS+ Server TCP Port >]
[key=<"Double Quoted String" | NONE >]
[ENABLE]
[DISABLE]

Description:

At least one TACACS+ server must be defined and enabled for authentication to proceed.

Options:

Setting the key to NONE uses clear text instead of encrypted transport.
Configure the key to match the server being used.

Examples:

tac pri ipaddr=192.168.0.205 port=49 key="foobar" enable

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user – Configure Local User IDs.

Synopsis:

user <Tag> [login=”Double Quoted String”]
[passwd=”Double Quoted String”]
[auth=<Authorization Level>]
[aaaop=< BEFORE | AFTER | NEVER >]
[tacacs=< ENABLE | DISABLE >]
[radius=< ENABLE | DISABLE >]
[ports=< [+][-] <Range> | ALL | NONE >]
[DELETE]
[ACTIVATE]
[DEACTIVATE]

Description:

The user command creates and administers locally stored user IDs on the **T-40**.

The handle **<Tag>** is a numeric value to identify a particular USER ID. The “admin” USER ID does not have a **<Tag>** and cannot be administered with this command.

The value of **<TAG>** may be from 1 through the maximum number of users defined for the **T-40**. That number may change in the future. As of the time of this authorship, it was set to sixteen locally defined users.

Options:

The User ID, as used to gain access to the **T-40**, is defined by the **[login=”Double Quoted String”]** option. Please note that the User ID is not a word, and can be a complete name or pseudo name. For example, “Lucky Eddie” is a perfectly valid User ID. The quotes are not entered when the User ID is actually used. The length is limited to 31 characters including all spaces. Special characters are not allowed. The User ID is case sensitive.

When the User ID is created, it is given a default password of "**initial**". That may be changed with the **[passwd="Double Quoted String"]** parameter, or by the user with the **chgpass** command. The password may be a word or phrase up to 31 characters in length including spaces. For example, "My dog ate my homework", minus the double quotes, is a perfectly good password. The password is case sensitive.

Each User ID has an associated authorization level. That level implies which commands they are able to execute on the **T-40**. The list of the commands, and their required level, was at the beginning of this section. The authorization level for the user being defined is set with the parameter **[auth=<Authorization Level>]** with **<Authorization Level>** being **GEN**, **ADM1**, **ADM2**, **ADM3**, or **ADM4**.

The **[aaaop=< BEFORE | AFTER | NEVER >]** option determines how the User ID defined is used when one or more authorization server are defined and operational. The **BEFORE** attribute will allow the user ID to be verified before an authorization server is inquired. The **AFTER** attribute will allow the user ID to be verified after an authorization server is inquired and that inquiry has not be accepted by the server. The **NEVER** attribute means the User ID is never verified locally if there is an operational authorization server.

The **[tacacs=< ENABLE | DISABLE >]** option specifies if a TACACS+ server is to be inquired depending on the setting of the aaaop=<#> option.

The **[radius=< ENABLE | DISABLE >]** option specifies if a RADIUS server is to be inquired depending on the setting of the aaaop=<#> option.

By default, a User ID does not have authority to access any of the ports. That is given with the **[ports=< [+][-] <Range> | ALL | NONE >]** parameter. The signs on the range are to edit any already provided value. The value of **ALL** is equivalent to a range of **+1-40**, and the value of **NONE** is equivalent to the range of **-1-40**. The plus indicator on a given range is optional.

The User ID may be made inactive, but not deleted, with a **DEACTIVATE** option. This eliminates the need to re-enter all the information when the User ID is again desired.

The User ID is made active with the **ACTIVATE** option if previously deactivated; or is a new user that has not yet been activated.

The User ID may be deleted entirely with the **DELETE** parameter. If a User ID in the middle of the list is deleted, the <Tag> associated with each user will be compacted on

the next reboot of the **T-40**. But, an empty <Tag> may be re-used immediately if no reboot is performed.

Examples:

user 1 login=”Arnold Ziffle” passwd=”Green Acres” auth=ADM4
user 1 aaaop=before tacacs=enable radius=enable
user 1 ports=all activate

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