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Quick Start - TCP/IP

There are several factory default port parameters that will aid you in the setup of the **ELS**. Each port has a default **TCP/IP** and **TELNET** listener (socket) assigned to it. All ports have a **TCP/IP** socket of 4000 plus the port number (port 1 is 4001, port 2 is 4002 etc.). Each port also has a default **TELNET** socket of 3000 plus the port number (port 1 is 3001, port 2 is 3002 etc.). All ports are set to **ACCESS dynamic**, this means that any port can initiate connections (for example terminals can make **TELNET** connections) as well as receive connections from the Ethernet (for example you could connect a printer to a port).

In order to put the Equinox Terminal Server on a **TCP/IP** network, you must assign an **IP** address to it. The following are brief examples of how to program the Terminal Server for a **TCP/IP** network. The commands shown are only examples and should be changed accordingly for your network. In order to do these commands you must be in **PRIVILEGE mode**. This is accomplished by typing **SET PRIVILEGE** at the **Local>** prompt and entering the default password **SYSTEM**.

IP Address

This example assigns an **IP** address to the ELS and makes the default protocol **TELNET**. The IP address that you specify **MUST** be unique. It is good practice to attempt to **PING** this new address from another node before you install the ELS to assure that the **IP** address is not already being used by another node.

1. **DEFINE SERVER IP *200.200.0.25***
2. **DEFINE PORT ALL DEFAULT PROTOCOL TELNET**
3. **DEFINE SERVER DEFAULT PROTOCOL TCPIP**
4. **INITIALIZE SERVER**

After the above is completed you should be able to successfully **PING** other **IP** nodes on the same Ethernet segment. **Gateways** (Routers) are discussed below.

Remote Hosts

The following defines names of remote nodes so the user can connect to the host by name.

1. **DEFINE NODE *HOST1* IP *200.200.0.10***
2. **DEFINE NODE *HOST2* IP *200.200.0.15***
3. **INITIALIZE SERVER**

After the above is completed you should be able to successfully login to nodes on the same Ethernet segment.

- at the **Local >** prompt, enter **telnet *host1* <CR>**

Gateways

If your network has a **GATEWAY** or router, this is how to define the node as a gateway so you can connect to hosts on another network.

1. **DEFINE NODE *GATE1* IP *200.200.0.5* GATEWAY ENABLE**
2. **INITIALIZE SERVER**

After the above is completed you should be able to successfully login to nodes on the same Ethernet segment as well as nodes on the other side of a gateway.

For example: To connect to a remote node

*   at the **Local >** prompt enter **telnet *200.201.0.29***

Modems

The following commands define a **MODEM** for out-bound calls and one for in-bound calls

Out-bound

1. **DEFINE PORT 1 OFFERED TELNET 5001**
2. **DEFINE PORT 1 ACCESS REMOTE**
3. **DEFINE PORT 1 DEVICE MODEM SPEED 9600**

In-bound

4. **DEFINE PORT 2 ACCESS LOCAL**
5. **DEFINE PORT 2 DEVICE MODEM SPEED 9600 AUTOBAUD ENABLE**
6. **INITIALIZE SERVER**

To connect to the out-bound **modem**, **TELNET** to the **IP** address of this Terminal Server and socket number. For example:

*   **telnet *200.200.0.25 5001***

Printers

This is an example of how to set up a printer for **remote printing**. You must still use a program (such as the Equinox **rprint** utility) on your UNIX host that will allow remote printing through a Terminal Server

1. **DEFINE PORT 3 OFFERED TCPIP 6003**
2. **DEFINE PORT 3 ACCESS REMOTE**

3.   **DEFINE PORT 3 DEVICE PRINTER**
4.   **DEFINE PORT 3 SPEED 9600 AUTOBAUD DISABLE BROADCAST DISABLE**
5.   **INITIALIZE SERVER**

Dedicated Port to Host

This assigns a dedicated connection from a port on your Terminal Server to a host. The user just needs to turn on the terminal and press **return** to establish a connection to the host. The user will **_not_** see a **Local >** prompt from the Terminal Server.

1.   **DEFINE NODE *HOST3* IP *200.200.0.20***
2.   **DEFINE PORT 4 DEFAULT PROTOCOL TELNET**
3.   **DEFINE PORT 4 DEDICATED NODE *HOST3***
4.   **DEFINE PORT 4 AUTOCONNECT ENABLE**
5.   **DEFINE PORT 4 AUTOPROMPT ENABLE**
6.   **INITIALIZE SERVER**

Remote Console

The **remote console** is a service on the ELS that allows you to connect to it remotely and configure the Terminal Server. The factory default socket is **23** but can be changed as in the following example:

1.   **SHOW SERVICE HERE (*Look for a service RC_00807D######*)**
2.   **DEFINE SERVICE RC_00807D###### 5049 TELNET ENABLE**
3.   **INITIALIZE SERVER**

To access the **remote console**

*   **TELNET** to the **IP address** of the **ELS** with the socket number, for example:
     (e.g. Telnet 200.200.0.25 5049).
*   The **ELS** will prompt you for a password with a pound sign greater-than prompt **(# >).**
*   The default password is ***ACCESS***

Quick Start - DNS (Domain Name Server)

The example below shows how to set up the Equinox Terminal Server to be used with **DNS**. The basic function of **DNS** is to provide information about the network by answering queries. You must complete the necessary steps above (**IP ADDRESS**, **GATEWAYS** etc.) before you try to utilize **DNS**.

1. **DEFINE NODE *NAME_SERVER* IP *200.200.0.26* NAMESERVER DEFAULT**
2. **DEFINE SERVER RESOLUTION REMOTE**
3. **DEFINE SERVER LEARN NODE ENABLE**
4. **DEFINE SERVER DOMAIN NAME *EQUINOX.COM***
5. **INITIALIZE SERVER**

Where:

NAME_SERVER is the node name of your **DNS** Host and

IP is the **IP** address of your **DNS** Host.

Quick Start - SLIP (Serial Line Internet Protocol)

This is a brief example of how to set up the Equinox terminal server for **SLIP.**

1. **DEFINE SERVER SERIAL INTERFACES 1**
2. **DEFINE PORT 7 AUTOBAUD DISABLE SPEED 38400**
3. **DEFINE PORT 7 BREAK DISABLE FLOW DISABLE**
4. **DEFINE PORT 7 DEDICATED SLIP**
5. **DEFINE PORT 7 SERIAL LOCAL IP 200.200.0.27**
6. **DEFINE PORT 7 SERIAL REMOTE IP 200.200.0.30**
7. **DEFINE PORT 7 SERIAL LEARN DISABLE**
8. **INITIALIZE SERVER**

To establish the **SLIP** connection, type

•   **CONNECT PORT 7 SLIP**

Quick Start - SNMP

The example below defines a community on the Equinox terminal server called **PUBLIC** that enables **write** capabilities.

1. **DEFINE SNMP COMMUNITY "Public"**
2. **DEFINE SNMP COMMUNITY "Public" WRITE ENABLE**

Quick Start - Menus

The **User Menu** feature allows the System Manager to configure one or more menus on a per port basis. The **User Menu** displays selectable items which perform standard Terminal Server commands.

1. **DEFINE MENU WELCOME** *"Welcome to the Equinox Terminal Server"*
2. **DEFINE MENU PROMPT** *"Please Select a Number"*
3. **DEFINE MENU GROUP MENU1**
4. **DEFINE MENU GROUP MENU1 ITEM 1 TITLE** *"Connect to HOST1"* **COMMAND** **"C TELNET IP 200.200.0.10"**
5. **DEFINE MENU GROUP MENU1 ITEM 2 TITLE** *"Connect to Modem"* **COMMAND** **"C TELNET IP 200.200.0.20 5001"**
6. **DEFINE MENU GROUP MENU1 PORT 1-5** *(Assigns menu to ports 1-5)*
7. **INITIALIZE SERVER**

Novell Print Server (IPX)

This example shows how to set up the Equinox Terminal Server to be used as a ***Novell Print Server.*** Once this is accomplished, the ELS, if configured properly, can be shared between Novell, LAT and TCP/IP print requests. This set of commands must be entered after logging into your Novell file server and obtaining supervisory rights.

File Server

1. **Allow unencrytped passwords = ON**
2. **Activate PCONSOLE utility and create the print server and print queues.**
   a. **Print Server = ELS Server Name**
   b. **Print Queues = ELS Service Name**
3. **For each print queue created, define the characteristics of the printer.**
4. **Save the changes in PCONSOLE.**

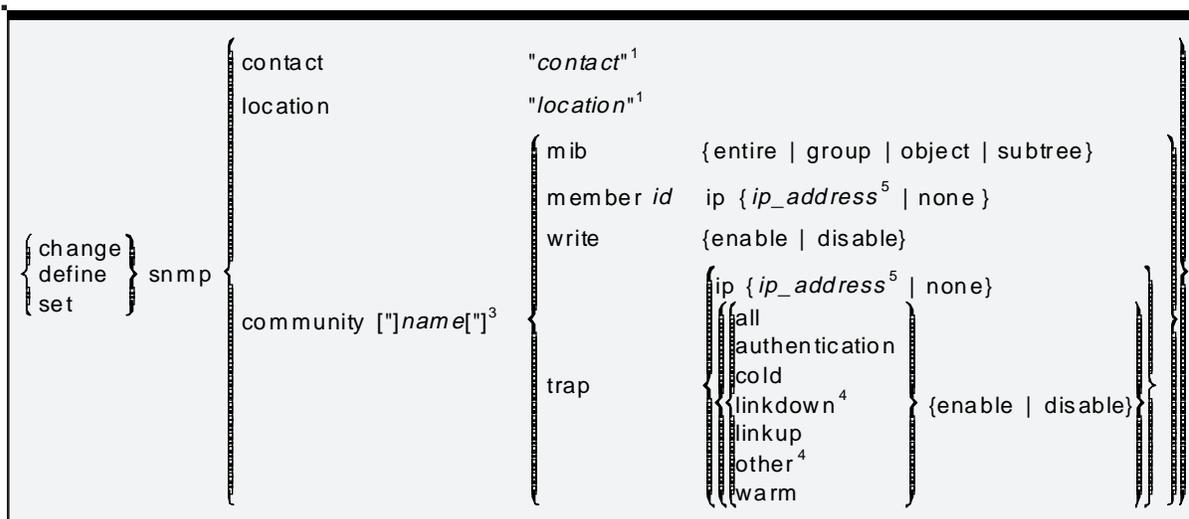For more information, please refer to your Novell manuals.

ELS

1. **DEFINE SERVER NAME SERVER1** *(Must be the same name that resides on Novell file server.)*
2. **DEFINE PORT 8 DEVICE PRINTER SPEED 19200 AUTOBAUD DISABLE**
3. **DEFINE PORT 8 ACCESS REMOTE**
4. **DEFINE IPX NOVELL1** *(Name of file server.)*
5. **DEFINE SERVICE SALES_PRN PORT 8 IPX ENABLE QUEUE ENABLE**
6. **INITIALIZE SERVER**

SNMP Commands Summary

This summary describes additions to the Equinox Terminal Server's command set supporting additional SNMP capability. Enhancements include:

- The ability to report asynchronous events and take configuration changes from an **SNMP** management system.

- The Server allows the System Manager to create up to 8 **SNMP** communities. Each community controls an action to be taken when specific events (traps) occur.

- Each community may have up to 4 specific members defined to it.

- Specifying members for a community confines the community's actions to only those members. Refer to the description on page for further details.

- Along with the communities, information messages reporting the server's location and whom to contact are incorporated within the SNMP support.

```
                    contact            "contact" 1
                    location           "location" 1
                                       mib          {entire | group | object | subtree}
                                       member id   ip { ip_address 5 | none }
 change                                write        {enable | disable}
 define   snmp                                       ip { ip_address 5 | none}
 set                                                 all
                                                     authentication
                    community ["]name["] 3                 cold
                                       trap        linkdown 4     {enable | disable}
                                                     linkup
                                                     other 4
                                                     warm
```

SNMP Configuration Commands

contact   Textual information which is reported to an SNMP management system. This information is generally used to identify the user or group which has responsibility for managing the terminal server. Up to 64 characters of text may be entered for the contact information. This string must be enclosed within double quotes (").

location   Another 64 character text string, normally used to describe where the terminal server is located. This string must be enclosed within double quotes (").

> If no communities are defined within the terminal server's Operational database, all server MIB-II information may be read by **any** SNMP management station.

Note **1**

community   Creates a named set of hosts which share common access and modification privileges. Up to 8 communities are definable within the terminal server.

name[3]   A unique identification string, up to 16 characters in length. When enclosed within double quotes ("), the names' textual case is preserved. Otherwise, the name is converted to all uppercase. Wildcards (leading or trailing '*') are allowed within community names for the show, list and monitor commands.

mib   Specifies which part of MIB-II will be supported by the community. The following levels of support may be selected by the system manager. *Group*, *object* and *subtree* may be selected individually. Selecting *entire* enables all the other supported *mib* options.

> **entire**   Access to the entire *mib*, all variables.
>
> **group**   Allows access to the major group, which is the first level below a subtree.
>
> **object**   Allows controlling of individual objects called out within the MIB-II.
>
> **subtree** [4]   Allows controlling of the mib-2 subtree. Currently, the other MIB-II subtrees (i.e. experimental and private enterprises) are not supported within the terminal servers.

member   Supplies IP addresses for the remote systems which are member of this community. Each community may have up to 4 members assigned to it. The individual members are identified by a numeric code (*id*) ranging between 1 and 4 inclusive. This identification number precedes each member's information on the <u>characteristics</u> display.

> **ip_address** [5]   Specifies a specific host as a member of this community.

none   Disables this specific member's use.

> If no members are assigned to a community, then **any** IP address has access to this community.

Note 2

trap   Traps are asynchronous events generated from the Terminal Server to the specified host. Typically these messages report major system events, which are often failures.

> *ip_address* [5]   The internet address of the host to which trap conditions are reported. If a valid *ip_address* is not configured, trap exceptions which occur are not reported.
>
> **all**   All trap conditions are reported.
>
> **authentication** Reports an attempt by a SNMP host to modify a server characteristic which it is not authorized to modify.

cold	The Terminal Server's SNMP was restarted from a power up condition.
linkdown [4]	The network interface link failed.
linkup	The network interface link started.
other [4]	When enabled, report any *trap* which is not explicitly controlled individually. Currently, no additional *traps* are defined, but this option is included for future utilization.
warm	The Terminal Server's SNMP was given a warm restart. In Equinox servers, SNMP operation may not be stopped and restarted independently of the entire server. If a server software download has been initiated and subsequently fails a <u>cold</u> trap may be issued instead of a <u>warm</u> trap. If the download succeeds, a <u>warm</u> trap will be issued. *Warm* traps are issued an **initialize server** or **import** command causes a server reset.

write   Determines if the remote SNMP host may write (perform SNMP sets) to the Terminal Server's database. A characteristic which has been **set** from an SNMP host will be updated in the permanent database. Some characteristics are also updated in the Operational database. Only members of a *community* with its *write* characteristic can change a server's database.

MIB-II OBJECTS WHICH CAN SUPPORT READ/WRITE REQUESTS	
MIB Object	**Support Level**
SYSTEM GROUP	
sysContact	Operational and Permanent databases.
sysName	Internally split into Server Name and (optional) Domain Name. The Server Name and Domain Name are modified in the Permanent database only.
sysLocation	Operational and Permanent databases.
INTERFACE GROUP	
ifAdminStatus	Not supported.
ADDRESS TRANSLATION GROUP (ARP)	
atIfIndex	Stored internally, no user interface.
atPhysAddress	Stored internally, no user interface.
atNetAddress	Stored internally, no user interface.
IP GROUP	
ipForwarding	Not supported.
ipDefaultTTL	Stored internally, no user interface.
IP ROUTING TABLE (GATEWAY)	
ipRouteDest	Stored internally, no user interface.
ipRouteIndex	Stored internally, no user interface.
ipRouteMetric1	Stored internally, no user interface.
ipRouteMetric2	Stored internally, no user interface.
ipRouteMetric3	Stored internally, no user interface.
ipRouteMetric4	Stored internally, no user interface.
ipRouteMetric5	Stored internally, no user interface.
ipRouteNextHop	Stored internally, no user interface.
ipRouteType	Stored internally, no user interface.
ipRouteAge	Stored internally, no user interface.
ipRouteMask	Stored internally, no user interface.
IP ADDRESS TRANSLATION TABLE (ARP)	
ipNetToMediaIfIndex	Stored internally, no user interface.
ipNetToMediaPhysAddress	Stored internally, no user interface.
ipNetToMediaNetAddress	Stored internally, no user interface.
ipNetToMediaType	Stored internally, no user interface. May be dynamic, static or invalid.
TCP CONNECTION TABLE	
tcpConnState	Stored internally, no user interface.
SNMP GROUP	
snmpEnableAuthenTraps	Stored internally, no user interface.

SNMP CHARACTERISTICS DEFAULTS	
Characteristic	**Default Value**
SNMP Contact	"" (None)
SNMP Location	"" (None)
Community *name3*	No communities are automatically created. A community is created, (set snmp community **x**) with the settings which follow.
Mib	Entire
Member IP *ip_address5*	All entries are 0.0.0.0.
Trap	
IP *ip_address5*	None - 0.0.0.0.
Authentication	Disabled
Cold	Disabled
Linkdown	Disabled
Linkup	Disabled
Other	Disabled
Warm	Disabled
Write	Disabled

$$\{clear \mid delete \mid purge\} \; snmp \begin{Bmatrix} all \\ community \; \{all \mid ["]name["]^3\} \end{Bmatrix}$$

SNMP Deletion Commands

clear   Erases SNMP related information from the Operational database.

delete   Erases SNMP related information from the Operational and Permanent databases.

purge   Erases SNMP related information from the Permanent database.

        all   For the selected database (Operational or Permanent) the SNMP contact and location are cleared. Furthermore, all communities' characteristics are reset to their default values.

        community   Only the selected communities are affected by the command.

        all   Information about all of the communities are removed from the selected database.

        ***name* [3]**   Information about the community which matches the entered name is removed from the selected databases.

```
{list | monitor | show} snmp [ community [[["]name["]2,3 | all]   [summary | characteristics]]]
```

SNMP Database Display Commands

show   Displays information extracted from the Operational Database.

list   Displays information extracted from the Permanent Database.

monitor   Continuously displays information extracted from the Operational Database.

Unlike other terminal server displays, some SNMP characteristics may be modified from a remote network management station. Supported changes are described in the table on page. Ports which have **security** enabled cannot examine the SNMP database entries.

community   Extracts information about the selected community or communities for displays. Otherwise the SNMP *contact* and *location* information is displayed.

        all   All communities within the selected database are included within the display.

        name [2,3]   Only communities which match the given name are selected for display. With wildcards, this may be more than one community.

characteristics A complete showing of all characteristics for database items selected for inclusion in the display is presented.

summary   For communities, the display only shows the name, trap, ip-address and number of associated members.

$$[restore \mid save] \; snmp \; \left[\left\{ \begin{array}{l} all \\ community \quad \{all \mid ["]name["]^3\} \end{array} \right\} \right]$$

SNMP Restore and Save Options

save   Copies information from the Operational database into the Permanent database.

restore   Transfers information from the Permanent database into the Operational database.

all   The SNMP contact, location and all communities' information is moved.

community   Characteristics for the selected community or communities are moved.

        all   All communities within the selected database are moved.

        name [3]   Each community which matches the given name is selected for duplication.

```
show count [dns | snmp]
```

Miscellaneous DNS/SNMP commands

dns   Counters specifically related to the Domain Name System support are shown.

snmp   Counters specifically related to Simple Network Management Protocol support are displayed.

New Keywords:

To support the SNMP Contact, Location and Communities database several new keywords were added to the terminal server. This list summarizes the new keywords and their minimum abbreviation.

KEYWORD	ABBREVIATION LENGTH	KEYWORD	ABBREVIATION LENGTH
authentication	2	member	2
cold	2	mib	2
community	3	object	2
contact	3	other	2
entire	2	snmp	3
group	2	subtree	2
linkdown	5	trap	2
linkup	5	warm	2
location	3	write	2

Additional Messages

723   **Community *name* is not known.**

This message is displayed whenever the SNMP community name provided for a clear, delete or purge SNMP command is not in the terminal server's database. Remember that SNMP Community names are case-sensitive. Possibly retry the command enclosing the *name* within double quotes (").

724   **All SNMP Community database entries are in use.**

This message is displayed whenever an attempt to change, define or set SNMP community command is given and the maximum number of communities already exist.

725   **Duplicate SNMP member *ddd.ddd.ddd.ddd***

If the system manager attempts to assigned the same IP address (except 0.0.0.0) to two members of the same community this message is displayed and the entire command refused.

726   **Broadcast address not allowed "255.255.255.255"**

This message is displayed when an attempt is made to set an SNMP Community's Trap IP address or a Member's IP address to the TCP/IP broadcast address. Select a valid IP address and re-enter the command.

Footnotes

1   Strings must be enclosed by double quotes ("). Text case and embedded white space will be preserved.

2   Wildcards (leading * or trailing *) may be entered as part of the name. All community names which match the wildcard specification will be selected for the entered command.

3   Unless enclosed within double quotes ("), the SNMP Community name is converted to uppercase. Some SNMP management systems are case-sensitive.

4   These characteristics' settings are not meaningful in the initial implementation. They are defined now for possible support in future revisions of the SNMP sub-system.

5   An address of 255.255.255.255 may not be used for this *ip_address* since it represents a TCP/IP broadcast.

Export and Import Commands Summary

The ability to save a Terminal Server's <u>permanent</u> configuration offline and subsequently restore the saved configuration has been added to the Equinox Terminal Server family. Configuration transfer from the terminal server to offline storage is performed using the EXPORT command. Subsequent retrival of the configuration from an offline source into the terminal server initiated using the IMPORT command.

E X P O R T
I M P O R T

Configuration Transfer Commands

On the terminal server, a **configuration transfer** may be performed from any serial port. Also, the transfer is supported from the Remote Console connected via the ethernet. However the transfer may not be performed when the Remote Console is accessed from the DSS Supervisory Port (see message 759 on page).

The actual transfer is made using the **Xmodem** protocol. The system manager must use his/her host application to send or receive the database information.

The terminal server's configuration transfer process is fully integrated into the EquiView product.

Usage Rules:

General

- User must be privileged to issue either the **Export** or **Import** commands.
- Neither export nor import may be abbreviated.
- Cannot Export a configuration while the permanent configuration is in the process of being saved. The "Data Base Status" can be checked by issuing a show server status command.
- Cannot Import while a server reset (delayed initialization) is pending. A pending reset may be verified by looking at the "Minutes to Shutdown" area on the show server status display.
- The **Permanent** database may not be modified while a configuration transfer is in progress. This applies to all characteristics, including those items which may be modified by a non-privileged user.
- If an Import is initiated and then aborted, the server's "Receive Buffers" will have been set to small in the Operational database. The Permanent database setting is not modified. The current "Receive Buffers" setting is given on the show server characteristic display.
- As previsouly stated any port on which someone may log into the server may be used. This precludes parallel printers, protocol translation and such ports.
- Files exported from one server may be imported into a different server of the same type. The Ethernet address and Remote Console service name for the server into which the data is imported will be preserved. The network manager must insure that duplicate Internet Protocol addresses are not active on the network as a result of a configuration import. This could occur if a configuration for a server with an IP address is imported into another server! **This situation can result in network problems**.

- Files exported from one type of server (ELG-48, ELS-16 etc.) may not be imported into another type of server.
- The ethernet address and serial number of the terminal server into which a file is imported are not changed, although this information is stored within the configuration file.
- The configuration files may not be modified while offline and then reloaded into the terminal server. Any attempt to do so will result in unpredictable behavior.

Remote Console

- Transfer via a DSS Supervisory Port is not allowed. Refer to message 759 on page .
- A LAT connection to the Remote Console is automatically placed into passall. Upon completion of completion or termination of the configuration transfer, the session is returned to whichever mode it was in when the transfer started.
- In order to use TCP the server's remote console service must be modified to support a socket. Also, be sure the service's telnet characteristic is disabled.
- In order to user Telnet the server's remote console service must be modified to support a socket. Also, be sure the service's telnet option is enabled. The connection to the remote service established in Binary Mode. When connecting to the Remote Console from a terminal server port be sure the characteristics match those described in the following table.

TRANSFER VIA REMOTE CONSOLE USING TELNET	
Port Characteristic	Setting
Input/Output Flow Control	Disabled
Telnet Binary Transmit	Will Do
Telnet Keys	Disabled
Backwards Switch	None
Forwards Switch	None
Local Switch	None

Serial Port

- The characteristics for a serial port, from which a transfer is performed, are automatically set to those required by the Xmodem protocol. After the export completes, or either transfer is aborted, these characteristics are reset to their initial settings.
- A serial port on a server used to initiate a connection to another server's Remote Console must be configured manually.

Protocol

The configuration transfer is performed using the standard Xmodem data transfer protocol. Individual block checksums are supported. Circular Redundancy Checking (CRC) is not supported.

- Receipt of a CAN (control X) by during a configuration transfer aborts the transfer. A reminder of how to abort the process is given in the Export and Import initiation messages (762 and 763).

- If an Export or Import is begun and no data or unexpected data, is received within about 30 seconds, the transfer is aborted. This allows plenty of time for the user to initiate the Xmodem transfer in his/her communication package.

- Once initial synchronization is reached, the timeout reduces to 6 seconds.

File Format

A 128 byte System Id block begins each database configuration file. This header provides information used to validate the data during an import. If any of the fields within this file are in error, the entire configuration is rejected. Since the Header Message is in ASCII text, it may be viewed with most standard file utilities or just copied to the user's console.

* Major components of the header block are:

Header Message: A text message which identifies the file, up to 75 characters.

System Type: A message of up to 16 bytes which identifies the type of terminal server to which the file belongs. Valid system types are: ELG-48, ELS-48, ELS-16 and ELS-8.

System Name: The server's name when the file was exported. This is up to 16 bytes.

System Version: First 10 bytes of the server's software version running when the configuration was exported. Normally, this space allows the entire version identification is saved, but may be truncated in some situations.

File Format: The terminal server configuration file format level. The server's operational software will not accept files in a format different than they will produce.

File Size: An integer holding the number of 128 bytes blocks the configuration requires + 1.

Checksum: A single byte checksum of the System Id block. Since the header block has its own checksum (independent of the protocol checksum) manual modification of the header block causes the entire file to be rejected during an import.

* Files exported from one type of server (ELG-48, ELS-16 etc.) may not be imported into another type of server.

* The file sizes created depend upon the type of server. These sizes are summarized in the following table:

CONFIGURATION EXPORT / IMPORT FILE SIZES (DOS)		
Standard Memory		**Expanded Memory**
ELG-48, ELS-48	ELS-8, ELS-16	All Servers
16512 bytes	8320 bytes	32896 bytes
129 Xmodem blocks	65 Xmodem blocks	257 Xmodem blocks

Miscellaneous Changes:

- The port state of "Database Transfer" is displayed for a port which has an export or import in progress.

- The show server status display's "Data Base Status" has two new display values. While an export is active "Export in Progress" is shown. Similarly, "Import in Progress" is displayed while the import is active.

Added messages:

759   **Cannot Export or Import configuration from DSS Supervisory Console**

Only seen in a DSS connected to the ELG's Remote Console from the Supervisory Terminal's Command Mode. This connection is established using the DSS command sys remote x, where x is the slot containing the ELG. This message serves as a reminder that the transfer will not be attempted. The Export/Import terminates after this message is shown.

The ELG configuration may be transferred via a DSS line connected via a Fixed Connection or call to an ELG serial port. Be sure the DSS connection allows 8 bit data without parity or flow control! Alternately, an LAT or TCP/IP connection can be made to the ELG's Remote Console.

760   **Cannot Export configuration while database Save In Progress**

Changes made to the permanent database are in the process of being written to the terminal server's non-volatile configuration memory. Until this process completes, a server database export is not allowed. Wait for the Save In Progress to complete then re-issue the export command.

761   **Cannot Import configuration while Server Initialization pending**

The system manager has issued a initialize server delay xx command which is still pending. Although the reset may be quite a way off, an import will not be started while the terminal server is waiting to reset. If a database import is needed, issue an initialize server cancel command to abort the pending reset. Then re-issue the import command. Keep in mind that the server will reset immediately upon completion of the import.

762   **Export begun, ^X to abort**

This message is displayed in response to the export request. Once displayed, the user should start his/her communication application using Xmodem and initiate a down-load.

763   **Import begun, ^X to abort**

This message is displayed in response to the import request. Once displayed, the user should start his/her communication application using Xmodem and initiate an up-load.

764   **Export completed**

The configuration has been transferred completely. Normal system operation may resume.

765   **Import completed**

This message will never be seen by the user. It is defined, and used during system debugging.

However, in actual practice, the terminal server resets before this message is seen.

766 **Export aborted**

A cancel request was received within the input data stream, or the protocol is mismatched or a timeout expired. In any case, retry the export command. If the problem persists, try a different communication application on your host.

767 **Import aborted**

A cancel request was received within the input data stream, or the input data failed. The file uploaded could be invalid or the protocol is mismatched. If the problem persists, try a different communication application on your host. Also, verify the file being imported was created used and ETS export command.

768 **Terminating character received**

This message should never be seen by the user. It indicates that an internal processing error has occurred. Retry the export or import command. If the problem persists, try using a different communication application on your host.

990 **Server Database Imported**

This console message is displayed after the server is reset. It reminds the system manager that the current configuration is from a fresh import. This message is only displayed to the server's console the first time after resetting because an import completes. As with all console messages, this one will only be shown if the imported configuration has a defined server console port, and that port is a fixed speed.

802.2 SNAP Header Support and Command Syntax

The format of Ethernet frames on a LAN can be configured in two separate manners. These two framing types are known as Ethernet Type 2 framing and 802.3 framing with 802.2 SNAP headers. One section of the Ethernet frame is used either to identify the protocol type or the number of bytes in a frame. In Ethernet Type 2, the field is used to identify the protocol type. In 802.3 with 802.2 SNAP headers, this field is used to identify the number of bytes in a frame. 802.3 Ethernet with 802.2 SNAP headers is used only with certain TCP/IP implementations, typical in U.S. DoD, Government installations, and some European countries.

The Equinox ELS servers provide the ability to switch the Ethernet framing from the standard Ethernet Type 2, (default) to 802.3 with 802.2 SNAP headers to support these implementations. The framing is changed on a server basis, and cannot be changed for individual ports. This feature is used only in conjunction with elements of the TCP/IP protocol suite, and does not affect operation of the LAT protocol. Using 802.3 framing, the 802.2 Sub-Network Access Point (SNAP) framing is used to force outgoing Ethernet frames to comply with 802.2 Type-1 procedures with SNAP headers as defined in the RFC1042 specification for Ethernet framing. The 802.2 eXchange IDentifcation (XID) and 802.2 TEST Link (TEST) are both supported as part of this implementation.

The command syntax to enable 802.3 Ethernet with 802.2 SNAP framing is defined below:

{change | define | set} server snap {enabled | disabled}

(Note: the keyword "snap" may be replaced by "sn").

The default configuration is Ethernet Type 2. The current value for the Ethernet framing can be viewed by using the **{SHOW | LIST | MONITOR}** Server Characteristics TCP command.

Novell Print Server (IPX) Commands Summary

This summary describes additions to the Equinox Terminal Server's command set allowing the ELS to be a Novell® Print Server. Printing is controlled by the creation of IPX records which represent file-servers. Additionally, services, representing the Novell print queues are defined. Specific commands for setting up the file-server and services are provided below.

Additionally, a properly configured server allows sharing of printers between Novell, LAT and TCP/IP print requests.

To use IPX printing the following information must be configured on the Novell file-server and Equinox Terminal Server. Details of how to configure these items are presented below.

Novell File-server

- Define a Print Server, using the **PCONSOLE** utility. The Print Server name must match the ELS Name. Do <u>not</u> define a password for the Print Server.
- Define one or more Print Queue Names, using the **PCONSOLE** utility. The names must match the Service names used on the ELS.
- If using NetWare 3.x or newer, turn on Unencrypted passwords.
- If you wish users to be notified of job status and error conditions, enable notification for the "**capture**" command.

Equinox Terminal Server

- Define the ELS name to match the Novell Print Server entry.
- Create services matching each Novell Print Queue which will be supported by this ELS.
- Configure ports assigned to the services to accept print jobs.
- Create IPX entries for each Print Server supported by this ELS.

$$\left\{ \begin{array}{l} change \\ define \\ set \end{array} \right\} ipx \; fs\_name \left\{ \begin{array}{ll} poll & poll\_secs \\ retry & retry\_attempts \\ stalltime & stall\_minutes \\ timeout & timeout\_secs \end{array} \right\}$$

IPX (file-server) Configuration Commands

A maximum of 12 IPX file-server entries may be added to the ELS database.

fs_name	Name which identifies the Novell file Server from which print requests will be solicited. File Server names may be up to 48 characters long.
poll	Specified in seconds, the poll characteristic specifies how often the ELS will poll the Novell Print Queue. The polling interval may be set between 1 and 60 seconds. Lower settings will start print jobs faster at the expense of more Terminal Server overhead and network traffic.

retry	A count which specifies how many retransmissions will be performed before aborting a print job. The retry count may be between 1 and 200. The combination of timeout and retry settings controls when a print job will be aborted and recovery from other protocol errors.

> If the Retry Limit is reached, it is possible that the ELS will stop servicing the Print Queue. To restart servicing of the print queue issue a **zero ipx** command.

stalltime	Expressed in minutes, it is how long a print job's data is stalled before a message may be given to the user. The message is only set to the user when notify is enabled on the Novell Capture command. The IPX stalltime can be set from 1 to 60 minutes.

timeout	The number of seconds, between 1 and 60, the Terminal Server will wait for a response from the Novell file-server. The combination of timeout and retry settings controls when a print job will be aborted and recovery from other protocol errors.

IPX CHARACTERISTICS DEFAULTS	
Characteristic	**Default Value**
Poll	5 seconds
Retry	20 attempts
Stalltime	20 minutes
Timeout	12 seconds

$$\{clear \mid delete \mid purge\}\ ipx\ \begin{Bmatrix} all \\ fs\_name \end{Bmatrix}$$

IPX Deletion Commands

clear	Erases IPX related information from the Operational database.

delete	Erases IPX related information from the Operational and Permanent databases.

purge	Erases IPX related information from the Permanent database.

    all	For the selected database (Operational or Permanent) all IPX file-server information is removed.

    fs_name	The IPX name for the file-server information which is removed from the selected database.

$$\{list \mid monitor \mid show\}\ ipx\ \begin{Bmatrix} all \\ fs\_name \end{Bmatrix} \begin{bmatrix} characteristics \\ status \\ summary \end{bmatrix}$$

IPX Database Display Commands

show   Displays information extracted from the Operational Database.

list   Displays information extracted from the Permanent Database.

monitor   Continuously displays information extracted from the Operational Database.

      all   Includes each of the IPX entries from the selected database in the display.

      fs_name   Identifies only those IPX entries with matching names for inclusion in the displays. The IPX name may be specified using the terminal server wildcard character (*) as either the first or last character of the name.

      characteristics A complete showing of all settings from the selected database is presented.

      status   Provides realtime information about communication with the selected file-server(s). When communication has been established with a file-server this information includes Frame-Type, Receive-Sockets, Ethernet Address, Net and Node addresses (as reported by the Novell file-server). If communication with the file-server has not been established or has failed, the IPX status display reports this condition.

      summary   Shows the IPX file-server names and poll time.

$$\left\{ \begin{array}{l} \text{restore} \\ \text{save} \end{array} \right\} \text{ipx}$$

IPX Restore and Save Options

save   Copies information from the Operational database into the Permanent database.

restore   Transfers information from the Permanent database into the Operational database.

All IPX file-server information is saved or restored at once. Saving and restoring individual IPX entries is not supported.

$$\left\{ \begin{array}{l} \text{monitor} \\ \text{show} \end{array} \right\} \text{count ipx}$$

Miscellaneous IPX Commands

ipx   Counters specifically related to the IPX support are shown. Counters as sub-divided into IPX, NCP, RIP/SAP/WDP and Interface sections. Counter information may be used to help troubleshoot problems.

```
zero ipx
zero server ipx
```

IPX Zero Commands

zero ipx Resets the internal IPX data structures. Also restarts polling of the Novell file-servers.

zero server ipx Resets the IPX counters and statistics to zero. Do not confuse this command with zero ipx

```
          ⎧change⎫
          ⎨define ⎬  service service_name ipx [ enabled | disabled ]
          ⎩set    ⎭
          {show | monitor} sessions [PORT [ALL | port_range]]
```

Miscellaneous Command Changes

{change | define | set } service

A new service characteristic of ipx has been added to the selected database(s). When enabled, ports assigned to the service may be used for Novell printing. When disabled, IPX connections will not be made to the ports. Remember that multiple ports may be assigned to the same service.

> The setting of a service's queuing characteristic changes the way IPX support for a queue is performed. If the service is to be accessed via the LAT or TCP/IP protocols and IPX, the service queue option must be **enabled**. When it is disabled, IPX support keeps the port in a "connect" state, not allowing multiple uses of the port.

{ monitor | show } session

The session display format has been modified to contain IPX information. Included within the display are the Job Number, Job Offset, and Current State. The Current State information is encoded and not directly meaningful to the end user. However this information is included on the display for trouble-shooting purposes.

New Keywords:

To support the Novell Print Server operation several new keywords were added to the terminal server. This list summarizes the new keywords and their minimum abbreviation.

KEYWORD	ABBREVIATION LENGTH
ipx	3
poll	2
retry	2
stalltime	2
timeout	2

Additional Messages:

730   All IPX FileServer database entries are in use.

The maximum number of IPX file-servers (12) already exist in the database. In order to add another IPX file-server, an existing one must first be removed from the terminal server's database.

731   FileServer "*fileserver*" not known.

An IPX file-server name which cannot be found has been entered for a show/list/monitor or clear/delete/purge command. Verify the correct spelling of the file-server's IPX entry in the database. Remember that the entire database may be selected using all. Also, be sure the file-server you are interested in is the database (Operational or Permanent) you selected.

732   Name must be from 1 to 48 characters

A *fileserver* name longer than 48 characters was entered on the command line. Since the entered text cannot possibly be a valid IPX name it is refused by the terminal server. Verify the correct IPX name and re-enter the command.

Novell Notification Messages:

Print Job is Done, on Queue = *service_name*

When notification on the Novell "capture" command is enabled, this message is sent to the user who enqueued the print job after printing has completed.

Printer Needs Attention, Queue = *service_name*

If the printer stops accepting data for longer than the stalltime specified in the IPX database entry, this message is sent to the user who enqueued the print request, if "notify" was enabled on the "capture" command.

Usage Hints:

The following information describes how to setup a Novell Print Queue and Equinox Terminal Server for printing.

- The Novell **PCONSOLE** utility is used to configure Print Servers and Print Queues. Information about this utility may be found in your NetWare® documentation.

- When using NetWare® version 3.x and above Unencrypted Passwords must be turned **on.** This is performed using the command:

  set allow unencrypted passwords=on

- Notification to the user of print completion and stalled jobs is specified as a parameter to the Novell capture command, using the "**NOTIFY**" option. For example:

  capture /queue=MIS_LASER/NOTIFY

Refer to your Novell documentation for further details.

- If print jobs are being split or interspersed with other jobs check the timeout setting for the Novell "capture" command. When printing jobs which take a long time to generate, the CAPTURE utility may split the printing into multiple print requests.

- The Equinox Terminal Server name may only be modified in the Permanent database. After it is configured the server must be reset. For example:

  Local> set priv
  Password>
  Local>> define server name MIS
  Local>> initialize

  When first configuring the terminal server, all IPX related information can be added to the Permanent configuration prior to the server initialization (reset) command being used.

- For each Novell file-server which will be accessed from the terminal server an IPX entry must be created. If the default settings are not appropriate they can be modified when the IPX is created or at a later time.

  The command:

  Local>> change ipx IS poll 7 stall 15

  is equivalent to:

  Local>> change ipx IS
  Local>> change ipx IS poll 7
  Local>> change ipx IS stalltime 15

- When the ports assigned to an IPX service are only being used for IPX printing disable the service's queue characteristic. If multiple protocols are used to access a port be sure to <u>enable</u> the queue characteristic for the service to which the port is assigned. For example to use only IPX printing:

  set service MIS_LASER ipx enable queue disable

  To configure a service shared by multiple protocols:

  change service MIS_LASER 3002 po 23 ipx enable queue enable anno enable

- Input flow control should be disabled for ports assigned as printers.

  Local>> change port 23 input flow disabled

- To flush a print job which was printed to the wrong printer using the wrong DOS®/Windows® driver:

1   On the Novell system, using the **PCONSOLE** utility,

   • delete the pending print job.

2   On the ELS

   • Logout the port, i.e. **logout port 23**

   • Reset IPX polling, i.e. **zero ipx**

   • The maximum number of queued services (per port) is 4.

Example:

This example shows how to setup both the Equinox Terminal Server and a Novell file-server for printing. Two print queues are created on the ELS. Note: this example is setting up an ELS-8 which has a parallel printer port available on port 23. Begin by filling in an IPX Configuration Information Table. Below is a blank table for your use and 2 copies filled in with information for this example.

CONFIGURATION INFORMATION	
Configuration Item	**Configuration Setting**
Novell File Server Name	
Print Server Name (ELS)	
Print Queue Name	
ELS Port	

CONFIGURATION INFORMATION	
Configuration Item	**Configuration Setting**
Novell File Server Name	IS
Print Server Name (ELS)	MIS
Print Queue Name	ACC_LASER
ELS Port	8 (serial, speed of 19200)

CONFIGURATION INFORMATION	
Configuration Item	**Configuration Setting**
Novell File Server Name	IS
Print Server Name (ELS)	MIS
Print Queue Name	MIS_LASER
ELS Port	23 (PRN, parallel)

Novell Commands:

This set of commands must be entered after logging into your Novell File Server and obtaining Supervisory rights.

1 Allow unencrypted passwords (Netware 3.x and above only):

set allow unencrypted passwords=on

2 Activate the **PCONSOLE** utility and create the Print Server and Print Queues.

- Print Server name of "**MIS**". Make sure there is no password associated with this Print entry.

- Print Queue names of "**MIS_LASER**" and "**ACC_LASER**", with MIS Servicing these services.

3 For each of the Print Queues created on the Novell File Server, define the characteristics of printers which will be serviced by the ELS.

4 Save the changes and exit PCONSOLE. The system wide Novell File Server setup is complete.

5 For each print capture user notification may be specified. If Job Completion and Job Stall notification is desired do the following:

capture /queue=MIS_LASER /NOTIFY
capture /queue=ACC_LASER /NOTIFY

If user notification is not desired do the following:

capture /queue=MIS_LASER /NO NOTIFY
caputre /queue=ACC_LASER /NO NOTIFY

ELS Terminal Server Commands:

Each of the following commands must be entered after becoming the privileged system user. Privileged status is obtained using the set ***privileged*** command.

1 Change the server's name to match the Print Server name entered on the Novell File Server. The ELS name may only be modified in the Permanent database. Note that the server name is automatically converted to uppercase.

define server name mis

2 Setup the port to which the printer will be connected. In this example, ports 8 and 23 (PRN) are being connected to the printers. Note that for a parallel printer you may need to specify either a Centronics or Dataproducts as the device type. This setting must match the cabling interface for the printer being installed.

change port 8 device printer access remote speed 19200 autobaud disable
change port PRN input flow disable device dataproducts

3 Test the printers for proper setting.

test port 8
test port PRN

Note that the Test Port command does not issue a Form Feed when it completes.

4   Define the File Server which offers the Print Queues which will be serviced by this terminal server.

> **def ipx is**

5   Define the services corresponding to the Print Queues offered by the Novell File Server.

> 5.1   This example allows the printer on port 23 to be accessed via IPX, LAT and TCP/IP.
> > **define service mis_laser 3002 po 23 ipx enable queue enable**

> 5.2   Setup the printer on port 8 to be accessed by Novell only.
> > **define service acc_laser po 8 ipx enable anno disable queue disable**

6   Now reset the terminal server so that all of the information from the Permanent database is used in the terminal server's Operational database.

> **initialize**

.

After the Equinox Terminal Server has re-booted, it attempts to establish a connection with the file servers defined by the IPX database once it receives a RIP (Routing Information Packet) packet. The RIP packets appear on the network about once per minute.

Notes:
1   Once the ELS Name has been defined and the server re-initialized, subsequent IPX, Port and Service modification may be made using the **change** and **set** commands

2   After creating a new Print Queue on the Novell file-server and its corresponding Service on the ELS, issue a **zero ipx** command. This causes the terminal server to re-attach to the Novell file-servers defined by the IPX entries

Troubleshooting:

Should something not work correctly, the following commands can be used to resolve the problem.

1   The command 1show or monitor count IPX, display IPX and related information.

> **show count ipx**

2   If a print job seems to be stalled the current status can be checked with the next command. This display include the Job Number, Job Offset and protocol used to access the port.

> **show session *port-number***

Where *port_number* is the number of the port which is assigned to service associated with a Novell Print Queue.

3   Display the status of the port. If the status is "xoff" and stays that way for a long time, the printer is probably jammed or offline. If the status is "idle" the printer is not receiving data from the terminal server.

> **show port *port-number* status**

4   If a print job stops, but other jobs are still queued, or if the file server has been re-booted after a conection has been established, issue a ZERO IPX command to restart the print server.

Static Sockets

This new feature is a mechanism by which the Equinox Terminal Servers will individually identify the port from which a TCP/IP connection is made. LAT connections are unaffected by this change.

This server characteristically controls the allocation of outbound TCP/IP sockets. The Command Syntax is:

{change | define | set} server [static] sockets *dd*

This characteristic will be displayed on the **show server char tcp** screen, as shown below:

```
    Equinox ELS-8 v3.02                                    Uptime: 0
    01:57:43
          IP Address: 200.200.0.212            Serial Number: XH000021
                Name: MINI2E                          Number: 0
                                                  Subnet Mask: 0.0.0.0
      Identification: Equinox Systems Inc., ELS-8
     Welcome Message: Welcome to the Equinox Server Network

     Keepalive Timer: 20sec                    Retransmit Limit: 8
         IP Revision: n/a              Nodename Resolution: Remote
        TCP Revision: n/a                        Learn Node: Disabled
     TELNET Revision: n/a                    TCP/IP Checksum: Disabled
              RLogin: Disabled              Default Protocol: Lat
     IEEE 802.2 SNAP: Disabled              Static Sockets: 8
         Domain Name: equinox.com.

          Slow Delay: 50ms                         Fast Delay: 50ms
          Gateway IP: 0.0.0.0                         Host IP: 0.0.0.0
           Load Name: ELS48EXP.SYS

    Mini2e>
```
Show Server Characteristics TCP Display

The servers' static sockets may be configured with a value between 0 and 10 inclusive, with a default value of zero. When set for 0, TCP/IP socket allocation is assigned randomly. When configured between 1 and 10, static sockets determines the number of sockets concurrently available for each port on the terminal server. In this mode TCP/IP sockets are allocated beginning at socket number 520 for port 1. Ten sockets are reserved for each port. The first available socket from each port's pool will be used for a connection (i.e. they are not allocated in a round-robin manner). The number of sockets used is controlled by the static sockets characteristics. If a session cannot be established because all allowed sockets are in use, message 203 *"Session Limit Exceeded"* is displayed. After a session disconnect, the socket may not be used again for approximately 4 minutes.

The starting socket for a port's pool is found by:

socket = 510 + (port-number * 10)

.
An example is shown below for Port #7 with Static Sockets set to 1.

Socket = 510 + (7 * 10) = 580

If Static Sockets were set to 5 in the above example, Port #7 would always use sockets 580 through 584.

SLIP and CSLIP - Usage and Commands

Support for the Serial Line Internet Protocol (SLIP) is included in the ELS Terminal Server firmware. SLIP allows LAN connectivity to be extended over serial lines, allowing remote devices to appear as if they are locally connected to a LAN. When a port on the ELS is defined as a "SLIP" port, remote devices can be connected to simply by specifying their IP address. The terminal server automatically routes all data addressed to and from the remote device, and allows the remote device to operate as if it were connected locally. A remote device can dial in to a network via a SLIP port and appear as if it is connected locally. Each serial port on the ELS can be defined as a SLIP port.

A compressed version of SLIP, known as CSLIP, has also been implemented. CSLIP compresses the IP header to reduce the frame size and therefore decrease the overhead required for a SLIP link. This provides more efficient transmissions over dial up lines where bandwidth may be limited. The remote device must also support CSLIP to take advantage of the benefits of this feature. The ELS terminal server can be configured to automatically detect CSLIP and adjust itself for this type of transmission.

The comprehensive implementation of this protocol includes several configuration parameters, statistics, **HELP** text, and SNMP support. The configuration parameters are listed and detailed on the following pages. The detailed information on SLIP Statistics are at the end of this section. The **HELP** test is "on-line", providing information on all the items listed in this section, and can be accessed by entering "**HELP SET PORT SERIAL**" from the command line. The enhanced SNMP support operates automatically, reporting information to the SNMP manager about the SLIP interfaces as if they were additional nodes on the network. New **ERROR MESSAGES** associated with SLIP are included at the end of this section.

SLIP links may be used for many purposes, and as a result, there are several parameters associated with SLIP that need to be configured on the ELS Terminal Server. It is possible to have separate IP addresses for the remote and local portions of the SLIP link. The local portion of the SLIP link is the port on the terminal server, and the remote portion of the link is the remote device. A SLIP link could be used for connection to a dedicated remote host, or as a dial-in line for remote SLIP users that could have various IP addresses. For this reason the SLIP port can be defined to use specific IP addresses, or the port can be set to "learn" the IP addresses of devices that connect to it.

The parameters that can be set for individual ports are:

- Remote IP Address
- Local IP Address
- Serial IP Address Learning
- ICMP Suppress
- Compressed SLIP
- Maximum Transmission Unit size

These options and how they are configured are displayed on the "**SHOW PORT TCP**" screen as the SERIAL Options.

The parameters that can be set for the entire server are:

- Maximum number of active SLIP links
- Subnet Mask

These parameters appear on the **SHOW SERVER CHARACTERISTICS TCP** screen as the Serial Interfaces parameters.

The Serial Interface Parameters, and the associated command syntax are discussed in detail on the following pages.

Configuring Ports For SLIP

Remote and Local IP Addresses:

IP addresses can be assigned for the local port and remote device as described above. The Local IP address is the address of the port itself, and the remote address is the IP address of the remote device. There are several reasons for having a remote and local IP address, including the ability to more effectively manage the network. Remote and Local IP addresses are assigned when a dedicated device is being used on the SLIP port. One example of an application for this might be a remote host that several users on the network need to connect to. In many cases the Local and Remote IP addresses will be the same. A single command can be used to define both the Local and Remote IP addresses, if they are the same. *The Local and Remote IP addresses must be configured as "none" or "0.0.0.0" if "Serial Learn" is enabled.*

The Command Syntax for Setting Local and Remote IP Addresses is:

{SET | DEFINE | CHANGE} PORT {port range | ALL} SERIAL {LOCAL | REMOTE} IP {address | none}

Notes:
1. The parameters "Local" and "Remote" may be deleted if both addresses are the same.
2. The IP address may be specified as "0.0.0.0" in place of "none". This should only be done if "Serial Learn" has been enabled.

The default for local and remote IP addresses is "0.0.0.0".

Serial IP Address Learning:

This feature causes the SLIP link to automatically learn the IP address of the remote device. A typical application for using this feature is for dial-in modem lines where any number of remote devices could be dialing in to the network. The Local and Remote IP addresses must be configured as "none" or "0.0.0.0" if "Serial Learn" is enabled.

The default setting for "learn" is **ENABLED.**

The Command Syntax For Setting Serial IP Address Learning is:

{SET | DEFINE | CHANGE} PORT {port range | ALL} SERIAL LEARN {ENABLED | DISABLED}

Slip Commands:

The commands to establish a SLIP connection are similar to those used for connecting to a Service. The DEFINE/CHANGE/SET PORT command (see ELS Manual) has been changed to accept SLIP as a keyword in place of "LAT, TELNET, RLOGIN, and TCP/IP". Other commands that can be used to establish SLIP connections are CONNECT PORT {integer} SLIP and the "SLIP" command which synonymous with "CONNECT PORT SLIP". To understand better how SLIP is handled in the Terminal Server, refer to the section on "Connecting to Services" in the ELS manual.

An example of the command to establish a SLIP connection is shown below:

CONNECT PORT {integer} {PREFERRED | DEDICATED} SLIP

Slip Statistics:

New STATISTICS screens have been added to aid in network management and provide information about the activity on the SLIP links. Information will only be displayed if a port has been defined as a SLIP port, and CSLIP information will only be provided if COMPRESSION has been set to ENABLED or REQUIRED.

The command syntax for displaying the SLIP statistics is as follows:

SHOW PORT {integer | ALL} COUNTERS SLIP

Port with SLIP enabled

```
——————————————————————   SLIP HISTORY   ——————————————————————
     Packets Transmitted:   1234       Bytes Transmitted:          12345
     Packets Discarded:       12
     Packets Received:       387        Bytes Received:             1234
     Received Too Short:       1        Received Bad Header:           3
     Receiver Overruns:        0        Received Bad Escapes:          0
```

Port with Compressed SLIP enabled

```
——————————————————————   SLIP HISTORY   ——————————————————————
     Packets Transmitted:   1234       Bytes Transmitted:          12345
     Packets Discarded:       12
     Packets Received:       387        Bytes Received:             1234
     Received Too Short:       1        Received Bad Header:           3
     Receiver Overruns:        0        Received Bad Escapes:          0
————————————————————— SLIP COMPRESSION HISTORY ——————————————————————
     Outbound Eligible:       22        Outbound Compressed:          22
     State Searches:           8        Search Misses:                 1
     Inbound Uncompressed      2        Inbound Compressed           456
     Inbound Errors    3                Inbound Discarded              3
     Inbound Too Big           0
```

ICMP Suppress:

This parameter affects the manner in which Internet Control Message Packets (ICMP) packets are processed by the terminal server. Disabling this feature causes all ICMP packets to be transmitted over the SLIP link. Enabling the feature causes only packets associated with the SLIP link to be transmitted. All other ICMP packets are silently discarded.

The default setting for ICMP Suppress is DISABLED.

The Command Syntax For Changing ICMP Suppress is:

{SET | DEFINE | CHANGE} PORT {port range | ALL} SERIAL SUPPRESS {ENABLED | DISABLED}

Compressed SLIP (CSLIP)

This feature compresses the IP header associated with all packets to provide increased efficiency and reduce the overhead over the SLIP link. When the feature is Enabled, a negotiation process will occur with the remote device. Normal SLIP packets will be sent until a CSLIP packet is received from the remote device. After the first CSLIP packet is received, all subsequent packets will be sent in the CSLIP format. This allows the port be used for SLIP or CSLIP connections. When the feature is Disabled, only SLIP packets will be accepted and sent. When the feature is set to required, all packets sent and received from the port will use the CSLIP format.

The default is ENABLED.

The Command Syntax For Changing The CSLIP Parameter is:

{SET | DEFINE | CHANGE} PORT {port range | ALL} SERIAL COMPRESSION {ENABLED | DISABLED | REQUIRED}

Maximum MTU Size:

This parameter sets the Maximum Transmission Unit size, where a transmission unit is a packet of data. When large amounts of data, (such as a file), is going to transferred over the SLIP link, the sending host will break the large file into "Transmission Units". ***The MTU setting on the port must match the MTU setting on the remote device(s).*** If the MTU setting on the terminal server does not match the MTU setting on the remote device, a connection will be rejected. The range that can be configured for the MTU is 128 to 1006.

The default setting for the MTU is 1006.

The Command Syntax For Configuring The MTU is:

{SET | DEFINE | CHANGE} PORT {port range | ALL} SERIAL MTU {value}

Other Notes On Configuring Ports For SLIP:

- SLIP and CSLIP are not compatible with in-band flow control, the FLOW CONTROL parameter for the port must be set for either no flow control (DISABLED) or hardware flow control (CTLSIG).

- A SLIP port may only have one session, so the parameter for LOCAL SWITCH, FORWARD SWITCH, and BACKWARD SWITCH must be set to "None".

- Break characters cannot be sent through a SLIP link. for this reason, the BREAK parameter must be disabled.

- Split-Screen Multisessions (VT420) support is not supported on SLIP links. The MULTISESSION parameters must be set to "DISABLED".

- The LOGOUT PORT {Range} and DISCONNECT PORT {integer} commands are valid for SLIP ports and will terminate the SLIP session.

- Terminations of SLIP connections are handled in the same manner as ports that are configured for dedicated connections. The various device types that can be selected (custom, DTR, PC, Modem) can be used to terminate the SLIP connection if the in-bound control signal goes low. Refer to the ELS manual for more information on configuring ports and device types.

Configuring The Server For SLIP:

There are two server parameters that can affect the operation of SLIP:

- Maximum Number of Concurrent SLIP Links
- The Subnet Mask

The parameter for the maximum number of concurrent SLIP links is adjustable from 0 to 16. ***This parameter must be set to a number greater than 0 to allow SLIP ports to operate.***

The default for SERIAL INTERFACES is 0. ***This number must be changed to a value greater than 0 to operate a SLIP link. This number must not exceed 16.***

The Command Syntax For Configuring The Maximum Number Of SLIP Interfaces is:

{SET | DEFINE | CHANGE} SERVER SERIAL INTERFACES value

The Subnet Mask is used for routing information to sub-networks connected to a backbone LAN in large installations. Additional Information about the Subnet Mask and associated command syntax is including the standard manual included with your ELS Terminal Server.

Several new Error Messages related to LAT have also been incorporated. These error messages and related explanations are listed below:

- 241-   **Connection to "name" not established -No active route found**
ACTION: Displayed when the the requested host could not be found. Check IP address/Subnet Mask settings.

- 320 -   **Input Flow Control setting on port "#" incompatible with SLIP usage**
ACTION: Check port FLOW CONTROL parameter.

- 321 -   **Output Flow Control setting on port "#" incompatible with SLIP usage**
ACTION: Check port FLOW CONTROL parameter.

- 322 -   **Local Switch setting on port "#" incompatible with SLIP usage**
ACTION: Verify LOCAL SWITCH parameter is set to "NONE".

- 323 -   **Forward Switch setting on port "#" incompatible with SLIP usage**
ACTION: Verify FORWARD SWITCH parameter is set to "NONE".

- 324 -   **Backward Switch setting on port "#" incompatible with SLIP usage**
ACTION: Verify BACKWARD SWITCH parameter is set to "NONE".

- 325 -   **Break Processing setting on port "#" incompatible with SLIP usage**
ACTION: Check BREAK parameter and set to "DISABLED".

- 326 -   **Multisessions setting on port "#" incompatible with SLIP usage**
ACTION: Check the MULTISESSIONS parameter and verify it is set for "disabled".

- 327 -   **Character Size setting on port "#" incompatible with SLIP usage**
ACTION: Check port Character size. SLIP links require data in 8-bit format to be able to transfer binary data.

User Menus

Overview

This summary describes the User Menu feature in the ELS Terminal Servers and the associated command syntax for configuring the menus. The User Menu feature allows custom menus to built for each user on the server to allow single keystroke access to hosts and services, as well as single keystroke command execution. The menuing feature can also be used to provide additional security. Once a menu is defined for a port, the user on that port is restricted to performing only the functions listed on the menu.

What is the User Menu Feature ?

The User Menu Feature enhances ELS Terminal Servers by providing one or more configurable menus. The User Menu displays selectable items which perform standard terminal server commands.

What can Menus do ?

Menus can perform nearly every command that can be issued at the local prompt. This includes connecting to a node or service, broadcast a message, log out, etc. It is also possible to issue commands requiring privileged operation providing the port is placed in privileged mode prior to making the menu selection.

Menus not only simplify the user interface but also provide security. Users can not issue commands from a menu screen with the exception of setting privilege. Since the privileged user is password protected, unauthorized users are locked out of command mode.

The Menu feature is also designed to display information pertaining to suspended sessions and the Local Switch Character. This information pertains to each individual port based on port configuration and activity.

How are Menus configured in the ELS ?

Menus are defined in the ELS server by the privileged user. The following is a List of Menu terms or names, and their definition.

- **Menu Welcome Text**

    A Welcome Message can be configured for the User Menus. The Welcome message can be as many as 64 characters and must be enclosed in (") double quotations. It displays on each port configured for Menu operation and is followed by a blank line.

- **Menu Prompt**

    The Prompt for a Menu selection can be configured. The default prompt is "Selection:". The Menu Prompt can be as many as 40 characters and must be enclosed in (") double quotations. It displays on each port configured for Menu operation.

- **Menu Group**

   A menu group contains the information provided to a port for User Menu Selection(s). The Menu Group consists of a configurable Menu Heading, one or more Menu Items, and a list of ports. As many as 10 Menu Groups can be configured in an ELS Terminal Server. One or more Menu Groups can be assigned to any and/or all serial ports.

- **Menu Heading**

   A title for each menu can be defined. It can be as many as 40 characters and must be enclosed in (") double quotations. The Heading is displayed at the left margin and is followed by a blank line.

- **Menu Item(s)**

   As many as 5 menu items can be defined for each Menu Group. Menu Items consist of a Title and a Command Text.

- **Item Title**

   The Item Title displays as part of the menu at the Users port. The title can be as many as 40 alpha numeric characters and must be enclosed in (") double quotations. The Item Title displays 5 characters to the right of the left margin.

- **Item Command**

   The ELS attempts to process the item command when the associated Menu Item is selected. The command can be as many as 40 characters in length and must be enclosed in (") double quotations. Only single commands can be entered as part of the command text.

- **Port List**

   Defines the port or ports to which the Menu Group is assigned. Standard port parameters for these ports will operate as they do without User Menus.

Special Commands

- **NoMenus**

   The "NoMenus" command, issued as an item command, will exit the User Menus screen and display the "Local" prompt.

- **Menu**

   When a port has menus assigned, but has exited the menu screen, from a "Local" prompt the Menu command reselects the User Menu screen.

Introduction

The System Administrator (SA) creates a set of menu groups. Each Menu Group (MG) is a logical collection of Menu Items (MI) which will be presented at a port. A MG has several components described in a later section.

Each port will be placed into either Command or Menu mode automatically when it logs into local mode. If any MGs are assigned to the port it is placed into Menu Mode. When a port is in Menu Mode, at the "local" prompt a Selection Menu (SM) will be dynamicly created by the operational software. Each SM is a composite of the MIs from the MG's to which the port is assigned. Also, included in the SM are entries for each of the port's suspended sessions. They are included in the SM in the order in which they would be selected by the Forward command (same as Show Session). Each SM item will be selectable by a dynamically created alphabetic identifier.

Display formats used in the following discussions are for illustration only.

Configuration and Operation

Menu Groups

Name   Identifies the Menu Group in subsequent commands. May also be displayed as part of the dynamically produced menu. The MG Name may be up to *16* characters in length. Menu Group names are always converted to uppercase.

Heading   Identifies the Menu Group within a Session Menu. A MG Title may be up to *40* characters in length. MG Headings must be enclosed within (") characters to preserve case and white-space. When defined a MG Heading is displayed at the left margin and followed by a blank line.

Menu Items   A maximum of *5* MIs may be included within each MG. Each MI consists of 2 parts:

- **Title** -

    Textual identification of this MI. This text is displayed as part of the menu provided to a port. Title may be up to *40* characters in length. It must be enclosed within (") characters.

- **Command Text -**

    A string of *40* characters in length. This command is processed when the menu item associated with the corresponding Title is selected. Must be enclosed within ("). Only single commands may be entered as part of the command text.

    If the Command Text is invalid or conflicts with the port's configuration errors will be produced <u>after the menu item is selected not when configured</u>.

- **Port List** -

    Defines the port or ports to which the MG is assigned. An MG is only used for those ports to which it is assigned.

Processing Rules

· Should more than 1 MG be assigned to a given port, the dynamically composed menu is built in the order the MGs are encountered in the server database. This is expected to be in alphabetical order by MG Name.

· The heading of a MG which does not have any MIs defined will still be displayed onto the user's terminal. This heading may be used as an adjunct to the server's Welcome Message.

· Each time a SM is produced, the server's Welcome Message will be displayed as the first line. The Welcome Message will be followed by a blank line.

· If a MG is modified between the time it is displayed to a port and the time a user makes a selection, the selection will be ignored and the menu redisplayed. An appropriate message should be sent to the user.

· When the server configuration is completely initialized, a single MG named **LOCAL** will be automatically defined. This MG will not be assigned to any ports. It will have the heading "Local Commands". It will contain the MIs listed in the next table.

DEFAULT MENU COMMANDS GROUP "LOCAL"	
MI Title	**MI Command**
Help	help
Server Status	sh
Test Own Port	t po loo in
Quit Server	exit

Commands Syntax

All text fields must be enclosed by double quote characters. This preserves the case and internal white space for the user defined settings.

Menu Database Modification Commands

group_name   Up to 16 character name identifying the Menu Group. This name is used by the system manager only. It is not displayed to the users as part of a menu. Note that a group name of "all" is not allowed for Menu Groups.

heading_text   An optional field which when defined is displayed as part of a Selection Menu. Headings may be up to 40 characters in length.

item_number   A number between 1 and 5 specifying which of the Menu Items within the named Menu Group is being modified.

item_text   A ELS command which will be processed by the ELS when a user selects the corresponding menu item. Each **item_text** may be up to 40 characters long.

item_title   A 40 character long string, enclosed within double quotes ("), used to identify commands to the user. This is the text included in a dynamicly created Selection Menu.

prompt_text   Prompt used at bottom of the Selection Menus. This field has a default setting of "**Enter Selection:**". The **prompt_text** may be up to 40 characters in length.

welcome_text   A general heading displayed at the top of each Selection Menu. This field may be up to 64 characters in length.

$$\{ \text{save} \mid \text{restore} \} \left\{ \text{menu} \left\{ \begin{array}{l} \text{all} \\ \textit{group\_name} \end{array} \right\} \right\}$$

Save & Restore Commands

· These commands copy all configuration information about the User Menu system between the Operational and Permanent configurations.

$$\{ \text{clear} \mid \text{delete} \mid \text{purge} \} \left\{ \text{menu} \left\{ \begin{array}{l} \text{all} \\ \textit{group\_name} \end{array} \right\} \right\}$$

Menu Database Removal Commands

· These commands remove selected Menu Groups from the Operational and / or Permanent database for the terminal server.

    * **clear**   Removes from the Operational database only.
    * **delete**   Removes from the Operational and Permanent database.
    * **purge**   Removes from the Permanent database only.

$$\{ \text{list} \mid \text{monitor} \mid \text{show} \} \left\{ \text{menu} \left[\text{group} \left\{ \begin{array}{l} \text{all} \\ \textit{group\_name} \end{array} \right\} \left[\begin{array}{l} \text{summary} \\ \text{characteristics} \end{array} \right] \right] \right\}$$

Menu Database Display Commands

group_name   The name of a specific Menu Group.

<div style="border:1px solid; padding:10px; text-align:center">

{ menu | nomenu}

</div>

Menu Commands

menu   Enables Menus for the terminal/port where the command is issued.

nomenu   A command which allows the user to exit the menu system. If this command is a
                menu item defined for the terminal/port.

set priv   The user can issue the "set priv" command at the menu selection prompt, to
                become the privileged user and exit the menu system.

Examples

After becoming privileged the system manager enters the following commands:

> **Local>> change menu welcome "Welcome to Equinox Network"**
> **Local>> change menu group out_pool heading "Modem Pool" ports 1-5**
> **Local>> change menu group out_pool item 1 title "High Speed" command "c lat modem96"**
> **Local>> change menu group out_pool item 2 title "Low Speed" command "c lat modem12"**
> **Local>> change menu group targets heading "Network Services" ports 1,3,7**
> **Local>> change menu group targets item 5 title "Finance" command "c lat FIN01B3"**
> **Local>> change menu group targets item 1 title "Mail" command "c tel 200.200.0.123"**
> **Local>> change menu group local ports 1-5 heading ""**

Port 1 enters local mode. The following menu is displayed.

> **Welcome to Equinox Network**
>
> **<1>   Help**
> **<2>   Server Status**
> **<3>   Test Own Port**
> **<4>   Quit Server**
>   **Modem Pool**
> **<5>   High Speed**
> **<6>   Low Speed**
>   **Network Services**
> **<7>   Mail**
> **<8>   Finance**
>
>
> **Enter selection: _**

Port 5 enters local mode. The following menu is displayed.

Welcome to Equinox Network

<1>   Help
<2>   Server Status
<3>   Test Own Port
<4>   Quit Server
         Modem Pool
<5>   High Speed
<6>   Low Speed

Enter selection: _

The System Administrator decides to remove the MG headings. Also, a Local Switch character is defined for port 5. Finally, the Selection Menu prompt is revised.

Local>> set menu group out_pool heading ""
Local>> set menu group local heading ""
Local>> set po 5 local ^]
Local>> set menu prompt "Selection>"

Port 5 now enters into local mode. The following menu is displayed.

Welcome to Equinox Network

<1>   Help
<2>   Server Status
<3>   Test Own Port
<4>   Quit Server
<5>   High Speed
<6>   Low Speed

Enter ^] to return to local mode after connecting
Selection> _

Port 5 decides to connect to a Low Speed Modem and subsequently returns to local mode because the modem isn't fast enough. A new connection to High Speed is made and the user again returns to local mode. The following menu is displayed.

Welcome to Equinox Network

<1>   Help
<2>   Server Status
<3>   Test Own Port
<4>   Quit Server
<5>   High Speed
<6>   Low Speed
  <A> Resume or <B> Disconnect session 2
  <C> Resume or <D> Disconnect session 1

Enter ^] to return to local mode after connecting
Selection> _

Option "B" is used and the menu is redisplayed. Note that normal disconnect and status messages will precede the menu display.

> **Welcome to Equinox Network**
>
> **<1>   Help**
> **<2>   Server Status**
> **<3>   Test Own Port**
> **<4>   Quit Server**
> **<5>   High Speed**
> **<6>   Low Speed**
>
> **   <A> Resume or <B> Disconnect session 1**
> **Enter ^] to return to local mode after connecting**
>
> **Selection> _**

The SA requests a menu summary display. For each Menu Group the Menu Items for which both a Command and Title are defined and the for which the group is assigned is shown.

> **Local>> show menu group all sum**

Menu Group	Useable Items	Ports
LOCAL	1-4	1-5
OUT_POOL	1-2	1-5
TARGETS	1 5	1 3 7

The SA looks at the current database settings for Menu Group "local"

> **Local>> show menu group local char**

Menu Group:	LOCAL
Heading:	
Ports:	1-5

Item	Title	Command
1	Help	
		help
2	Server Status	
		sh
3	Test Own Port	
		t po loo in
4	Quit Server	
		exit

New Messages

The following messages are added to the Terminal Server.

773   "Menu Group " *name* " is unknown"
A search of the selected database for the indicated name was unsuccessful.

774   "All Menu Group database entries are in use"

All 10 Menu Groups are in use. Examine the database to see if combining groups will provide the settings you need.

775   "A name of " *name* " is not allowed for Menu Groups"

An attempt to create a database entry for a Menu Group with a name which is not allowed was made. Chose a different name for the Menu Group. Currently, only "all" is disallowed.

Offered Sockets

Overview

The Offered Sockets feature of the ELS Servers allows TCP/IP and Telnet Socket Numbers to be assigned to specific ports on the server. One socket number can be assigned for TCP/IP connections, and one socket number can be assigned for Telnet connections. This feature is peticularly useful when connecting modems and printers to the servers, providing a simple method for allowing the host system to direct data outputs to specific ports.

The command syntax for defining socket number for ports is shown below:

{SET|DEFINE|CHANGE} PORT {*Port #*} OFFERED {TELNET|TCP/IP} SOCKET {*Socket #*}

Notes:

     1   *Socket #* must be a valid socket number for the system being used. Equinox recommends using socket #'s starting with 3001 for Offered Telnet services, and socket #s starting with 4001 for Offered TCP/IP services.

     2   After a Socket # has been assigned to the port, the port should be configured for "Access Remote". Refer to the ELS Terminal Server Commands and Messages section for additional information on configuring a port for access remote.

Keepalive Processing

Overview

Several new fields have been added to assist in the processing of TCP/IP information. These new fields were added to allow a user to configure parameters that had previously been fixed at the factory.

The new "Keepalive" feature keeps idle sessions "alive" by periodically polling the host the session has been established with. If a remote host does not respond to a Keepalive packet, the ELS server will retransmit the Keepalive packet to try and re-establish the connection to the host. The number of times the server will re-transmit is an additional parameter that can be configured.

The "Keepalive Processing" applies to terminal sessions as well as other devices connected to the ELS servers such as printers and modems.

Examples

The following examples assume that the "**Keepalive**" poll has been enabled.

A. Terminal Connections
   - Terminal A establishes a session with Host A.
   - Terminal A establishes an additional session with Host B, logs-in, and begins processing work on Host B.
   - The initial session with Host A is idle, and is "Kept Alive" with the "Keepalive" poll from the ELS.
   - If Host A does not respond to the "Keepalive" poll, the ELS will re-transmit the poll.
   - If Host A does not respond to the re-transmitted poll, after the configured number of re-transmissions is reached, the ELS will discontinue the session with Host A. A message will be generated by the ELS indicated that the session had been disconnected from Host A, and the session will be returned to a "Local" prompt.

B. Printer Connections
   - A Printer is designated as a resource on Host A.
   - Jobs are periodically sent to the Printer.
   - When the printer is idle, the ELS will "poll" Host A to ensure that it is still operational.
   - If Host A does not respond to the "Keepalive" poll, the session will be disconnected.
   - This frees up the port on the ELS server to allow Host A to re-connect to the Printer. If this processing did not occur, the server would continue to indicate that the Printer was busy, and would refuse or queue the connection request when Host A cam back alive.

Commands Syntax

The following examples demonstrate how to configure the ELS to use "Keepalive Processing".

1. This global parameter enables or disables the "Keepalive Processing" on the ELS server:

    {SET | DEFINE | CHANGE} SERVER TCPIP KEEPALIVE POLL {ENABLED | DISABLED}

    The default is "**ENABLED**".

2. This parameter sets the interval between "Keepalive" polls.

    The VALUE can be from 1 to 180, and indicates the time (in seconds) between polls.

    {SET | DEFINE | CHANGE} SERVER TCPIP KEEPALIVE TIMER {VALUE}

    The default value is 180.

3. This parameter sets the number of times the ELS will retransmit the "keepalive" poll before disconnecting the session.

    The VALUE can be from 1 to 16.

    {SET | DEFINE | CHANGE} SERVER TCPIP RETRANSMIT LIMIT {VALUE}

    The default value is 16.

4. This parameter sets the time between retransmits of the poll. The **VALUE** can be from 1 to 180, and indicates the time (in seconds) between polls.

    {SET | DEFINE | CHANGE} SERVER TCPIP RETRANSMIT TIMER {VALUE}

    The default value is 4.

Configuring for BOOTP Downloads

Overview

Most UNIX and UNIX-like operating systems (e.g. Interactive, SCO, Univel, AT&T, Dell, Intel, Microport, HP-UX, AIX, CLIX, etc.) include support for TCP/IP, the Internet protocol. A tftp deamon is usually included.

Installation

Step 1   Make sure the host has a tftp deamon active.

    In order to download the ELS/ELG Terminal Server software via BOOTP you must have a **tftp** (or **tftpd**) **deamon** active. The **tftp deamon** is probably active if an entry for tftpd shows up on the ps -eaf displays. For Berkley-based systems, the **deamon** is probably active if an entry for **tftpd** shows on the {**ps -aux**} displays. *Note: Some UNIX implementations bundle several deamons, or are able to dynamically create the tftp deamon.*

Step 2   Make sure the **tftp deamon** can find the file

    a. based on the name of the public directory, **or**
    b. the server itself has been configured with the exact name and path

    Some implementations of the **tftp deamon** allow GETS from a public directory. Place the *.sys file(s) in your public directory if your version of UNIX permits GETS from that location. Otherwise, place the files in any directory you prefer. The recommended directory for Equinox terminal servers is **/etc/eqx/**. The recommended file names are els48exp.sys and/or elg48exp.sys. If you are using a host that does not have a public directory, specify the entire path when configuring the ELS/ELG terminal server load name. Note that the load name cannot exceed 22 characters.

    Example 1 - Expanded memory ELS-8/ELS-16 terminal server:

      Local >> CHANGE SERVER LOAD NAME "/etc/eqx/els48exp.sys"

    Example 2 - Expanded memory ELG-48 terminal server:

      Local>> CHANGE SERVER LOAD NAME "/etc/eqx/elg48exp.sys"

Step 3   Make sure the UNIX permissions allow anyone to read it. (chmod 644 {filename} will normally do just fine.)

    You must provide global read permissions for the directory and the file(s) that are to be downloaded. Under UNIX, the **ls -l** command displays the file and directory names and permissions. Global permission for both the directory and the file(s) must include a r (read allowed). Note: The usual form for file permissions is a 10 character field without any spaces in the form of **drwxrwxrwx**, or even **-rw-r--r--**. Global read permissions for this application must be universal, that is the third character from the end must be an r.

Step 4   Make sure that the terminal server is configured for the proper Load Name (case sensitive) and Host Ip address. If the load host is not on your network, be sure to configure the Gateway IP address as well. You can verify the correct configuration by typing the following and displaying the server characteristics:

<div align="center">

Local> Show Server Characteristics TCP

</div>

udp Based tftp Listener

The **tftp** deamon refers to either a **tftp** deamon, or any **udp** based **tftp** listener. A **udp** based **tftp** listener has the following characteristics:

1.   **udp** relies on the existence of **ip**;
2.   **tftp** relies on the existence of **udp**;
3.   **tftpd** is the name usually given to the code that listens for **tftp** requests.

Download bootp

To initiate the download process on the terminal server, type the following commands:

<div align="center">

Local > set priv
Password > system (or your password)
Local >> initialize bootp

</div>

This resets the terminal server and requests the file from your tftp host. After a successful download, the terminal server resets and initializes with the new software revision. To verify the new release is installed enter:

<div align="center">

Local > show server characteristics

</div>

Look for *Revision* at the top left of the screen.

If Download of bootp unsuccessful

If the download of **bootp** to the ELS was unsuccessful you should verify that bootp is properly working on your load host. If you have two UNIX hosts on the same network, try a "**tftp get**" from the second host to the host where the sys file resides. If you are unable to "**tftp get**" a file from the load host the ELS will also be unable to get the file. Verify the **tftp** configuration on your load host. Check with the vendor of your operating system if you need more help.

LAT Key Firmware

Release 4.01 and later versions of the terminal server software counts the LAT keys that have been entered. The following relates to this new release of the software. The following changes have been made to the commands and displays the server will recognize:

- Addition of a new command to set the server LAT key value;
- Adding an option to the ZERO COUNTER command to provide for resetting the key value;
- The server status display has been changed to include information on LAT key values.

{DEFINE | CHANGE} SERVER LAT KEY

Enables outbound LAT/HIC connects. Each key permits up to four ports to able active at the same time.

{DEFINE | CHANGE} SERVER LAT KEY *"key_value"*

where

key_value adds a LAT key. The keys take effect immediately.
{**CHANGE** | **DEFINE**} add keys.
SET results in a message being displayed: *"729 Parameter cannot be modified by a SET command."*

ZERO COUNTER

Resets statistical counters or internal resources. A new parameter has been added to reset the key counter.

ZERO [COUNTER] [ALL | NODE ... | PORT port range | SERVER ...] ZERO [ARP | DNS | IPX | KEYS]

where

ZERO KEYS removes the LAT keys.

Server Status Display

The terminal server status display has been changed to include information on LAT keys:

```
Server Name:        GJK227           Ethernet Address: 00-80-7D-28-18-04
Server Type:        ELS-48           Internet Address: 200.200.0.227
Software Revision:  4.01                  Console User:
Boot Revision:      DLL  4.01         Privileged User:
Connections:        Enabled          Data Base Status: Okay
========================================================================
     Uptime:        0 01:03:43       Minutes to Shutdown: 0
========================================================================
RESOURCE USAGE -                           DIAGNOSTICS -
                    Cur  High   Max
                    ------------------       Server Summary -
Active Ports:        11    11    48          Selftest Status: Ok
Active Users:        11    11    48          Software Status: Ok
Active LAT Users:    10    11    49          Ethernet Errors: 0
Connected Sessions:  10    11    48          Resource Errors: 0
Active Circuits:      1     1    25             Board 2 Type: 24-Port-CS
HIC Queue Entries:    0     2    96             Board 3 Type: 24-Port-CS
% Memory Pool Used:  39    39   100
Local Services:       2     2    25       Port Error Summary -
Total Services:      81    82   512          Framing Errors: 0
Connected Nodes:      1     1    25           Parity Errors: 0
Reachable Nodes:     29    29 1,023        Buffer Overflows: 0
```

The values shown after *Active LAT Users* are the result of counting the keys. The *Max* column displays one plus the count of active LAT keys multiplied by four. The server status display is the only place any information about the number of active LAT keys is available.

Once the LAT keys have been entered you cannot display the keys. Therefore you should keep the LAT key license in a safe place in the event your LAT keys are zeroed or if the ELS configuration is reset to factory defaults.

The two line message **201 "Connection to NAME not established LAT License limits exceeded"** displays when an attempt is made to exceed the LAT License limits with a LAT connect. If an attempt is made to exceed the LAT License limit of the server with a HIC connect, the server will queue the HIC connect until the LAT License limit of the server would not be exceeded by the connect. At that point the server will make the connection.

Reverse ARP

Support for the client portion of Reverse ARP has been added to the terminal server. A field of "RARP TIMER" was added.

The terminal server will only issue Reverse ARP requests when the operational server ip address is all zeroes AND the operational server rarp timer is non-zero.

The requests will be issued based on the value of the operational server rarp timer. No automated save of the ip address is done, each time the server resets it will request an ip address, unless someone manually saves the server record. Below are shown the altered/added displays.
The server characteristics tcpip and set/define/change server help screens have been altered, and a set/define/change server rarp timer help screen has been added.

```
                   Show Server Characteristics TCP Display


    Equinox ELS-8 v3.07                                    Uptime: 0
01:57:43
          IP Address: 200.200.0.212              Serial Number: XH000021
                Name: MINI2E                             Number: 0
                                                    Subnet Mask: 0.0.0.0
      Identification: Equinox Systems Inc., ELS-8
     Welcome Message: Welcome to the Equinox Server Network

    Retransmit Timer: 4sec                      Retransmit Limit: 8
      Keepalive Poll: Enabled             Nodename Resolution: Remote
     Keepalive Timer: 180sec                       Learn Node: Disabled
         RARP Timer: 0                         TCP/IP Checksum: Disabled
              RLogin: Disabled              Default Protocol: Lat
     IEEE 802.2 SNAP: Disabled                 Static Sockets: 0
         Domain Name: equinox.com.

          Slow Delay: 50ms                            Fast Delay: 50ms
          Gateway IP: 0.0.0.0                            Host IP: 0.0.0.0
           Load Name: ELS48EXP.SYS

       Mini2e>
```

PPP (Point - to - Point Protocol)

Local ELS-48

IP Address

200.200.0.121

Serial PPP Link

Local Serial IP Address
200.200.0.121

Remote Serial IP Address
200.200.0.135

Remote Serial IP Address
200.200.0.121

Local Serial IP Address
200.200.0.135

Remote ELS-48

IP Address

200.200.0.135
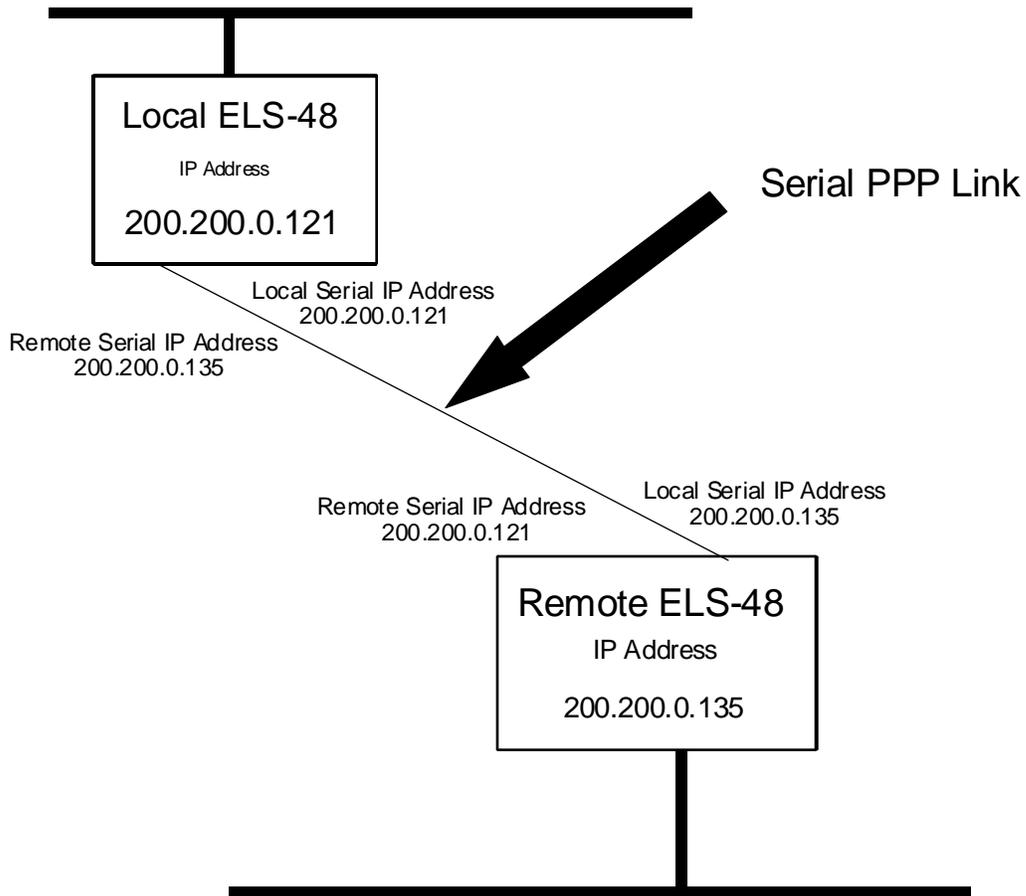
Connecting Two Networks Together VIA Terminal
Servers with one Port on each Configured for PPP

PPP

Support for Point to Point Protocol (PPP) has been added to the ELS Terminal Server. Follow the steps shown below for a "quick start".

Connecting two ELS/ELG terminal servers via a PPP link (See Figure One above).

On the "remote to the network" server enter the following:

Local > set privilege
Password>> [privilege password]
Local >> define server ip [IP Address] *skip this step if the ip address is already set*
Local >> define server serial interfaces [Maximum Number of PPP Links (*do not exceed 15)*]
Local >> define server subnet mask [Mask IP Address]
Local >> define node [Name] ip [Address of Remote Link] gateway default
Local >> define po [Port Number] device type dtr
Local >> define po [Port Number] autobaud disable
Local >> define po [Port Number] speed [Speed of PPP Link]
Local >> define po [Port Number] autoconnect enable
Local >> define po [Port Number] break disable
Local >> define po [Port Number] local switch none
Local >> define po [Port Number] dedicated ppp
Local >> define po [Port Number] autoprompt disable
Local >> define po [Port Number] serial learn disable
Local >> define po [Port Number] serial local ip (Local IP Address]
Local >> define po [Port Number] serial remote ip [Remote IP Address]
Local >> define po [Port Number] flow disable
Local >> define po [Port Number] access dynamic
Local >> initialize

On the "local to the network" terminal server enter the following:

Local > set privilege
Password>> [privilege password]
Local >> define server ip [IP Address] *skip this step if the ip address is already set*
Local >> define server serial interfaces [Maximum Number of PPP Links (*do not exceed 15)*]
Local >> define po [Port Number] device type dtr
Local >> define po [Port Number] autobaud disable
Local >> define po [Port Number] speed [Speed of PPP Link]
Local >> define po [Port Number] autoconnect enable
Local >> define po [Port Number] break disable
Local >> define po [Port Number] local switch none
Local >> define po [Port Number] dedicated ppp
Local >> define po [Port Number] autoprompt disable
Local >> define po [Port Number] serial learn disable
Local >> define po [Port Number] serial local ip [Local IP Address]
Local >> define po [Port Number] serial remote ip [Remote IP Address]
Local >> define po [Port Number] flow disable
Local >> define po [Port Number] access dynamic
Local >> initialize

Tearing Down a PPP Connection

Simply logging out the port that the PPP connection is assigned, in some cases, is not enough to restore the Terminal Server to normal operation. A situation occurs when name service is running on a network that will cause the IP traffic to get sent to the wrong Ethernet Address. Here is how to tear down a connection and reestablish communication via the Ethernet connection.

On the Terminal Server....

> **Local > set privilege**
> **Password>> [privilege password]**
> **Local >> lo po [Port Number of PPP Connection]**
> **Local >> define server mask 0.0.0.0**
> **Local >> initialize**

On the UNIX Nameserver Host....

> **arp -a**

Find the name of the Terminal Server the PPP link is to be torn down, then enter..

> **$ arp -d [Name of Terminal Server]**

On the Terminal Server....

> **Local > set privilege**
> **Password>> [privilege password]**
> **Local >> ping [NameServer IP Address]**

This should allow the Terminal Server to update the ARP table with the correct Ethernet Address.

Connecting to an ELS/ELG terminal server via a modem and establishing a PPP link (See Figure Two above).

> **Local > set privilege**
> **Password>> [privilege password]**
> **Local >> define server ip [IP Address]** *skip this step if the ip address is already set*
> **Local >> define server serial interfaces [Maximum Number of PPP Links (_do not exceed 15_)]**
> **Local >> define po [Port Number] device type modem**
> **Local >> define po [Port Number] autobaud disable**
> **Local >> define po [Port Number] speed [Speed of Modem or PPP Link]**
> **Local >> define po [Port Number] autoconnect enable**
> **Local >> define po [Port Number] break disable**
> **Local >> define po [Port Number] local switch none**
> **Local >> define po [Port Number] dedicated ppp**
> **Local >> define po [Port Number] autoprompt disable**

Local >> define po [Port Number] serial learn enable
Local >> define po [Port Number] flow disable
Local >> define po [Port Number] access dynamic
Local >> initialize

You are now ready to dial in with your software package that supports PPP and establish a PPP connection to the network via the dial-up modem.

Note: The speed of the modem must be set to the same as the speed of the serial port on the terminal server. The modem must have connect message enabled [Q0], Data Carrier Detect set to follow Data Terminal Ready [&C1], Number of Rings Before Answering set to one [S0=1] and the Data Terminal Ready function must be enabled [&D1]. (AT Q0 &C1 S0=1 &D1)

Multiscreen

The Multiscreen feature allows a data terminal on a port to automatically update the displayed screen (page) for the session that is being resumed. Multiscreen information is set up by the System Administrator. When defined for a port, the appropriate command text will be output to the port when a session is resumed. This command text will cause a stored page (in data terminals that support multiple page images) to be displayed. Different command text can be specified for the local session and each session (1 to 4).

Refer to your Data Terminal Documentation for the appropriate Command Text to cause a stored screen image to be displayed.

Local >> help define multiscreen

INFORMATION on DEFINE MULTISCREEN:

MULTISCREEN stores terminal commands to be output when resuming a session.

{SET I DEFINE I CHANGE}
 MULTISCREEN index { LOCAL I
 SESSION session } "text"

Local >> help multiscreen

INFORMATION on MULTISCREEN

MULTISCREEN INFORMATION is set up by the System Administrator. When defined for a port, the appropriate text will be output to the port when a session is resumed. Different text can be specified for the local session and each session (1 to 4).

In order to accommodate different terminals and applications, the System Administrator may define up to 7 sets of Multiscreen text commands. Each set has an index, numbered 1 to 7. Once a Multiscreen index is defined, the

SET/DEFINE/CHANGE PORT

command is used to enable Multiscreen text on the port(s) by specifying the desired Multiscreen index.

To disable Multiscreen text, set the port's Multiscreen index to 0.

This command may be used with terminals providing a multiple page memory to select a specific memory page upon resuming a particular session.

Local >> help define port multiscreen

INFORMATION on DEFINE PORTS MULTISCREEN

MULTISCREEN INDEX defines terminal commands for switching terminal memory pages when resuming a session.

> **{SET   I   DEFINE I   CHANGE} PORT [port range I ALL]**
>   **MULTISCREEN index**

Below is a "quick start" example for configuring the ELS terminal servers for multiscreen.

Note that all of the ^ [characters shown below must be generated by pressing the Esc key on the keyboard. This will cause an escape character to be sent to the terminal as part of the session switch information.

> **Local >> change multiscreen 1 local " ^ [[1U"**
> **Local >> change multiscreen 1 session 1 " ^ [[1U"**
> **Local >> change multiscreen 1 session 2 " ^ [[2U"**
> **Local >> change multiscreen 1 session 3 " ^ [[3U"**
> **Local >> change multiscreen 1 session 4 " ^ [[4U"**
>
> **Local >> change port 1-16 multiscreen 1**

The above will allow all 16 ports of a ELS-16 to utilize multiscreen capability on a DIGILab terminal. Up to 16 different multiscreen terminal types can be supported in each ELS. The characters that are defined in the double quotes above are sent to the terminal each time a session is changed.

To display the multiscreen session switch information by index number enter the following:

> **Local >> show multiscreen all**
>   **or**
> **Local >> show multiscreen 1**

>   **Local = " ^[[1 U"**
> **Session 1 = " ^[[2 U"**   **Session 2 = " ^[[3 U"**
> **Session 3 = " ^[[4 U"**   **Session 4 = " ^[[1 U"**

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